ANNUAL REPORT

OF THE

Board of State Viticultural Commissioners,

FOR 1889-90.

SACRAMENTO:
STATE OFFICE, : : : : : : : : J. D. YOUNG, SUPT. STATE PRINTING.
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OFFICERS AND MEMBERS OF THE BOARD.

ISAAC DeTURK, President...Santa Rosa.
Commissioner for the Sonoma District.

J. DeBARTH SHORB, Vice-President..San Gabriel.
Commissioner for the State at Large.

JOHN T. DOYLE, Treasurer..San Francisco.
Commissioner for the State at Large.

CHARLES BUNDSCHU..San Francisco.
Commissioner for the San Francisco District.

GEORGE WEST...Stockton.
Commissioner for the San Joaquin District.

R. D. STEPHENS..Sacramento.
Commissioner for the Sacramento District.

E. C. PRIBER..Napa.
Commissioner for the Napa District.

L. J. ROSE..Los Angeles.
Commissioner for the Los Angeles District.

G. G. BLANCHARD...Placerville.
Commissioner for the El Dorado District.

WINFIELD SCOTT..Secretary.

CLARENCE J. WETMORE ....Manager of Hall and Experimental Cellar.

CHARLES A. WETMORE.............Chief Executive Viticultural and Health Officer.

Office of the Board:
317 Pine Street, San Francisco.

REPORT OF I. DeTURK,

President of the Board of State Viticultural Commissioners, 1890.

SAN FRANCISCO, CAL., September 29, 1890.

To his Excellency R. W. WATERMAN, *Governor of the State of California:*

SIR: As required by law, I herewith transmit the financial report of the Board of State Viticultural Commissioners, showing the receipts and expenditures of the Board during the forty-first fiscal year.

Inclosed you will find a statement from Charles B. Turrill, as Secretary, in which the report will be found in detail.

Respectfully,

I. DeTURK,
President of the Board of State Viticultural Commissioners.

SAN FRANCISCO, June 30, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following report of receipts and disbursements for the forty-first fiscal year, ending June 30, 1890, as taken from the books in this office:

RECEIPTS.

Amount appropriated by the Legislature for the forty-first and forty-second fiscal years, from July 1, 1889, to July 1, 1891		$35,000 00

DISBURSEMENTS.

Salaries	$2,850 00	
Lectures	600 00	
Experimental work	2,794 21	
Commissioners' expenses	64 80	
Conventions	387 50	
Library	110 00	
Statistics	72 50	
Distributing information	30 00	
Office expenses	9,970 76	
State Analyst	600 00	
Total		17,479 77
Balance available for the forty-second fiscal year		$17,520 23

Respectfully,

CHARLES B. TURRILL,
Secretary.

REPORT.

SIR: I herewith submit my annual report as President of the Commissioners. Accompanying it will be found reports from the various District Commissioners, and other documents necessary to set forth the work of the Commission for the fiscal year ending June 30, 1890.

During the past year several changes were made in the membership of the Board. The terms of Charles A. Wetmore as Commissioner for the San Francisco District, Charles Krug as Commissioner for the Napa

District, W. S. Manlove as Commissioner for the Sacramento District, and J. DeBarth Shorb as Commissioner for the State at Large, expired by limitation. Commissioner Shorb was reappointed to succeed himself, but the other vacancies were filled by new appointments. Chas. Bundschu was appointed as Commissioner for the San Francisco District, succeeding Mr. Wetmore; E. C. Priber was appointed for the Napa District, succeeding Mr. Krug; and R. D. Stephens was appointed for the Sacramento District, succeeding Dr. Manlove.

Charles A. Wetmore, having held the office of President of the Board, as well as that of Commissioner for the San Francisco District, the former office became vacant with the expiration of his term as Commissioner. At the annual meeting, held June 9, 1890, I was elected to fill the office of President. J. DeBarth Shorb was elected to fill the vacancy created by my election as President, and Commissioner John T. Doyle became Treasurer in place of Charles Krug. At the same time Winfield Scott was elected Secretary in place of Charles B. Turrill.

No other changes in the personnel of the Board or in its officers have taken place. With the retirement of Chas. A. Wetmore from the Board and the Presidency of the Board at the same time, he retained his connection with us as Chief Executive Viticultural Officer, which position he still holds.

The retiring Commissioners, Messrs. Wetmore, Krug, and Manlove, carried with them the best wishes of all the members of the Board. Two of them—Messrs. Wetmore and Krug—had been with the Board since its organization in 1880, while Dr. Manlove had been identified with it since 1887. Their faithfulness and earnest work did much to foster the viticultural industry in every portion of the State.

The wine industry is just recovering from a period of over three years of depression caused by the largely increased production consequent on the extensive planting in the years prior to 1886. Experience during the past decade has proved that while the demand for our wines is growing, it is not growing at such a rate as to warrant any period of extensive planting, such as has in the past been indulged in from time to time. It must be borne in mind that Americans are not a wine-drinking people, as neither soil nor climate in the most thickly populated portions of the country are suited for wine growing. Those of our countrymen east of the Rockies who do not drink whisky, drink beer, to which they are more accustomed than to wine. The people are, however, gradually recognizing the merits of our wines, and from this time forth there may be expected a steady increase in the consumption of vinous liquors. This, and the fact that comparatively no new vineyards of wine grapes can come into bearing for at least four years to come, is a sufficient guarantee of prosperity for the producers in the next few years.

The planting of wine grape varieties has been almost totally suspended since 1888, though a few vineyards have been set out here and there. On the other hand, large areas of these vines have been destroyed by various diseases. The Anaheim disease has cleared out between ten thousand and twelve thousand acres of vines in Southern California, and in Napa and Sonoma Counties many vineyards have succumbed to the phylloxera. These losses in the total area of land set to vines have been counterbalanced many times over by the extensive areas that have been planted to varieties suited for raisins and for table purposes.

Confidence, however, is being restored among the growers of wine

grapes and the makers of wine. An era of planting must soon begin under the increased demand for our wines. Experience with the phylloxera has taught the most progressive vineyardists that in all cases resistant stocks must be used, and experience in the wine markets shows the absolute necessity of grafting on only the finer varieties of grapes. We must and will have something better if the wines are to be accorded the degree of excellence for which all should strive. The importance of having only the finest varieties cannot be stated too strongly.

It must be remembered, too, that we have already had one great period of depression consequent upon overproduction, and that after it was past, viticulturists enjoyed their greatest years of prosperity. I refer here to the depression in the early seventies, which became so great that many vineyards were either abandoned or uprooted and replaced by grain fields or orchards. Yet in the early eighties, when the eastern market for our wines was only in its infancy compared to what it is now, prosperity prevailed in every section devoted to grape culture. The same will be true during the next few years, because there will be more drinkers of wine than there will be wine for them; and this period will last until the production once more reaches the ever increasing consumption in the States east of the Rocky Mountains.

This time, I believe, is far in the future. Our wines, which a few years ago were unknown, save by name, in nearly every eastern city of importance, can now be found in every city of size in the Mississippi Valley and on the Atlantic Slope. New York, Chicago, and New Orleans have become important distributing points, and branch houses or agencies have been established in those places by the principal producers and merchants. Not only this, but our wines and brandies are handled by wholesale dealers in cities of less importance. In a word, the facilities for distributing and selling our wines are infinitely better than ever before, and consequently our products are placed on sale in better form than ever before.

WORK OF THE COMMISSION.

The work of the Commission since the last report has been chiefly directed towards promoting the demand for and aiding the sale of our viticultural products. This policy has been pursued in every legitimate manner, and everything that could make friends for California wines and brandies has been done. But it must not be supposed that the other branches of our work have been neglected; on the contrary, we have continued to send out information on subjects connected with viticulture in all its branches. Not only this, but the Commission has continued its work in the experimental cellars, and has pursued several special investigations, notably the investigation conducted at San Gabriel by Prof. Ethelbert Dowlen into the causes and cure of the Anaheim disease. His report, to which especial attention is called, appears elsewhere.

Acting on the central line of policy, the Commissioners have had a series of lectures delivered in the principal eastern cities by Miss Kate Field, and have established a permanent exhibit in San Francisco, in connection with which a café is operated, in which wines and brandies of the producers and merchants can be sampled or compared.

Regarding the lectures of Miss Field, it must be said that they have exerted a very beneficial effect in stimulating the eastern demand for the best qualities of wines as well as for the ordinary grades. This

talented lady gave us all the benefits of her ability as a lecturer, and her personal influence. She was bitterly attacked by the Prohibitionists, as might have been expected, but her able efforts in inducing interest in and drinking of wines were productive of excellent results.

EXHIBIT AND CAFÉ.

A persistent and determined attempt is being made in some quarters to decry the value of the public exhibit in San Francisco, as a means of increasing interest in wines; and the café attached has been the subject of bitter and relentless attack without cause.

The Commissioners had several objects in view in establishing the permanent exhibit, and now, at the end of two years, it has proved an unqualified success.

I would call attention, in the first place, to the history of the exhibit, as bearing on its efficiency in carrying out the objects for which it was established.

At the meeting of the Commissioners, held June 11, 1888, the President, Charles A. Wetmore, brought up the subject, and after a full explanation by him, and a discussion by the members present, a committee was appointed to investigate the subject and report at a subsequent meeting. This committee, which consisted of Commissioners Wetmore, Shorb, and DeTurk, met at once, and on the following day reported their plans for the operation of such an exhibit.

The details for the display of wines and brandies were easily arranged, but the matter of providing a sampling department, free from all possible objection by the public and by the producers of wine, or wine merchants, was a more difficult matter.

It was finally decided that all producers and dealers should have equal rights and privileges in the exhibit; that their wines should be sold at the prices fixed by themselves; that after deducting necessary cost of retailing in the café (corkage, etc.), the money realized from the sale of the wines should be returned to the exhibitors; *that no exhibitor be allowed to fix his prices so as to come into unfair competition with the ordinary retail trade; that all undercutting of fair trade prices be discouraged by strict rules, and that visitors be guided solely by the catalogue in making selections of wine.*

At the same time it was decided to enlarge the scope of the experimental cellar.

These rules have been strictly adhered to in all cases.

At a meeting of the Board, held October 26, 1888, President Wetmore stated that the arrangements looking to the establishment of the exhibit in a room in the Mechanics' Institute building, on Post Street, had fallen through, in lieu of which he had engaged Platt's Hall, at 216 Montgomery Street. This action was indorsed. Considerable time was spent thereafter in making the necessary alterations in the hall so as to adapt it to the purposes of the Commission. The last months of 1888 were spent in gathering exhibits, and in January, 1889, the hall was opened with a fine representation of wines and brandies from every section of the State, and with a café attachment, which was managed with the ends of the Commission constantly in view.

Since the opening, the hall has been visited by thousands of sightseers from California, the East, Europe, Australia, China, and Japan,

Mexico, and Central and South America. These visitors have been shown every courtesy, and the café has proved a most valuable adjunct in this connection in introducing them directly to our wines and brandies. It is only fair to state that in our rooms—and in them only—have intending buyers of California wines and brandies been able to find a representative collection of our products, for not only are the merchants represented, but the producers from every section.

In the operation of this feature of our work, we have left behind every consideration of personal gain, and acted solely for the interests of all, no matter of which class. The café to-day is not and never has been a money-making institution, either for the Commission or for those whose wines are on exhibit. But its influence in fostering a demand for our wines, in showing visitors and buyers what each producer or merchant has to offer, in generally stimulating interest in California products, whether at home or abroad, has been so marked that I would most earnestly recommend that the means be provided by which a similar viticultural exhibit be opened in New York, with a café attached, and, if possible, in Chicago and London.

No better means of advertising the products of *all* without favors being given to *any* could possibly be devised, and while the expense would not be large the advantages which would accrue would be great beyond measure.

It was not to be expected that the Commissioners could inaugurate this valuable adjunct to the viticultural industry without violent opposition from those who object to the popularization of producers' brands, but the successful operation of the exhibit and café has caused most of this opposition to die away. Time and experience have sanctioned the wisdom of the step.

At present, the café is leased to capable restaurateurs, who supply only the wines and brandies from our exhibits to their patrons. The money received from the sale of these wines is returned to the exhibitors. The exhibit and café are visited by producers, merchants, the general public, and visitors and buyers from the East and abroad. In showing what the producers and merchants of the State have, it has proved itself invaluable.

As an educational medium for wine makers and merchants, the exhibit has done excellent service. It has created among all classes a desire to attain certain types, which are better understood than ever before. For instance, in the case of Sauternes, it has instructed the most progressive men what a Sauterne should be, and has stimulated a worthy desire to reach a high type. This is equally true in the case of other wines. A most marked and gratifying improvement has been made, too, in the bottling, labeling, and packing of wines since the display was opened. The first wines that were shown were, as a rule, badly bottled—bottled indiscriminately, would perhaps be a better term. Clarets were sent in Rhine wine bottles; sweet wine, in Rhine wine bottles; white wine, in claret bottles; Burgundy, in claret bottles, and every possible combination of errors in this respect could be noted. The labels were not as neat and tasty as those that are on the bottles now sent for exhibition. In a word, the principal merchants and producers have learned more about the proper manner of bottling and labeling wines in the past two years than in the whole period preceding in which wines were produced in the State.

An objection has been raised by unthinking or prejudiced persons against the privilege of sampling wines in the café. It must be remembered that if the exhibit is to have its greatest value as a means of disposing of wines, there must be facilities where they can be tasted. In connection with a restaurant this can be done without the least objectionable features being introduced. There is no indiscriminate bottle-opening on the premises; no wine is sold by the glass; and none can be *obtained except in the original unbroken packages.* This is a rule which is insisted on by every officer of the Commission, and is never broken. The unthinking, the prejudiced, and the ignorant who have joined collectively in an attack on our exhibit as the "State Saloon," therefore have nothing on which to base their assertions.

The operations of the café, and the disposition of the wines sent by exhibitors to the rooms of the Commissioners since the opening of the permanent exhibit, are shown by the following statement prepared by Mr. Wm. H. McNeil, the storekeeper:

RECEIPTS OF BOTTLES.

From all exhibitors from January 15, 1889, to June 30, 1890	15,596

DISPOSITION.

On exhibit	744	
Used as sample	238	
Used by exhibitor	414	
Sent to Paris	56	
Broken	44	
Returned	853	
Sold	8,255	
On hand June 30, 1890	4,992	
		15,596

The statement of sales from January 15, 1889, to June 30, 1890, is as follows:

Bottles sold	8,255
Bottles other disposition	2,349
Bottles on hand	4,992
Total	15,596

Amount received from sales, $4,081 15.

The money received from the sale of the wines was disposed of as follows:

Corkage and café	$1,145 25
Reserve Fund	377 30
Amount paid exhibitors	2,558 60
	$4,081 15

The variety of wines on exhibit in the hall of the Commissioners is limited only by the variety of wines produced in the State. The appended statement will show how varied and complete the exhibit is in every sense of the word.

WINES ON EXHIBIT.

SPARKLING.

Champagne	2

WHITE WINES (DRY).

Burger	2
Chablis	1
Chateau Yquem	1
Chasselas (Golden)	5
Gutedel	16
Hock	8
Haut Sauterne	3
Riesling	27
Sauterne	18
Semillon	2
Sauvignon Vert	4
Traminer	2
White wine	1
	90

RED WINES (DRY).

Beclan	1
Burgundy	23
Cabernet	10
Carignan	1
Chauche Noir	1
Chambertin	2
Claret	18
Grenache	1
Gros Mancin	1
Malbec	1
Margaux	1
Mataro	2
Pineau	2
Petit Syrah	1
Zinfandel	24
	89

SWEET WINES.

Angelica	11
Frontignan	1
Madeira	3
Malaga	5
Muscatel	15
Port	28
Tokay	2
	65

SHERRY.

Sherry	19

BRANDY.

Brandy	33

RECAPITULATION.

Sparkling	2
White (dry)	90
Red (dry)	89
Sweet	65
Sherry	19
Brandy	33
	298

VITICULTURAL CONVENTION.

The Seventh Annual Viticultural Convention was held under the direction of the Commissioners and in our hall, on August 13-17, 1889. In spite of the discouraged feeling then prevailing among the grape growers and wine makers, the Convention was well attended and the meetings were marked by spirited discussions.

The Convention was opened with an address by Charles A. Wetmore,

then President of the Commissioners. Following his remarks, the committees to sample the wines sent for examination were announced. These committees were composed of the following gentlemen:

White Wine Committee.—George Husmann, of Napa County; Julius P. Smith, of Livermore; William Rueff, of San Francisco; H. A. Merriam, of Los Gatos; Capt. J. Chamon de St. Hubert, of Fresno.

Red Wine Committee.—A. G. Chauche, of Livermore; Dr. John A. Stewart, of Santa Cruz; N. E. Rose, of St. Helena; Richard Heath, of Napa County; E. Dichman, of New York.

Sweet Wines and Brandies.—S. McCullach, of New York; George Johnston, of San Francisco; R. J. Harrison, of San Francisco.

These committees at once set about the examination of the wines submitted to them. It had been specially provided in the call for the Convention that old wines, as far as possible, be sent for this purpose and the vineyardists readily complied with this request. In all, two hundred and six samples of dry and sweet (fortified) wines and brandies were tasted and classified.

The opening session on the thirteenth was devoted to a discussion of the subject, "The Conditions now Prevailing in the Markets for Viticultural Products and the Causes of Depression in the Prices of Wine." I. DeTurk, of Santa Rosa, led the discussion, contending that distillation should be resorted to to dispose of the poor wines. The good wines would take care of themselves.

At the evening session Professor E. W. Hilgard, of the University of California, delivered an address in favor of the electric process of aging wine and advocating the pasteurization of all wines before shipping. This address provoked a long discussion between Professor Hilgard and President Wetmore, ending with an address by E. Dichman attacking both processes.

On the fourteenth, "The Present Prosperity of the Raisin and Table Grape Industries and Possible Dangers in the Future" was announced as the subject for discussion. B. N. Rowley read a paper showing how California raisins had crowded the Malaga raisins from the American markets. The evening session was devoted to a consideration of the proposition to dry wine grapes, W. P. Bartlett leading the discussion.

The subject discussed at the first session on the fifteenth was "Remedies for Present Difficulties, including Drying of Wine Grapes, Distilling, Coöperative Organizations, Popular Agencies in Eastern States and Foreign Countries, Improvement in Quality of Products, and Notable Defects that may be Overcome." The session was marked at times by sharp discussions. A paper on "Fermentation," bearing on the subject of the day, was read by R. E. Wood. In the evening, Arpad Haraszthy addressed the Convention on "Brandy Distillation." Prefacing his remarks with a review of the labors of the committee appointed by the Grape Growers and Wine Makers' Association, to organize a joint stock company to distill brandy, of which Mr. Haraszthy was Chairman, he referred to the fact that $100,000 had been subscribed by capitalists, but he had found that capital generally was not inclined to take hold of the enterprise unless the producers showed faith in the scheme by supporting it. The local wine merchants, he said, were in favor of the plan, but the wine growers must be up and doing if they wanted it to succeed. One drawback to securing capital was the fact that the Brandy Union could not at present be assured a sufficient amount of grapes

and wine to carry on business on a large scale. In order to overcome this difficulty, Mr. Haraszthy suggested that growers might insure the Union the delivery of a quantity of grapes sufficient to meet the demand in the various districts in which distilleries might be operated. He also suggested another plan to meet the approaching emergency, by proposing that growers contract to furnish one hundred thousand tons of grapes, to be distilled on small margins with the limited capital available. Another plan had been proposed, and that was to divide the vine-growing sections into districts, organize a local company with a practical man as President, erect a distillery, and have the surplus grapes of these districts made into brandy. If this were done, Mr. Haraszthy was confident that the Brandy Union could be formed and operated for a bottom figure. He further stated that the eastern market was fully supplied with wine, the cellars throughout the State were comparatively full of wine, and it was plain to be seen that it was useless to attempt to put this wine with that of the coming vintage upon an overstocked market. On the other hand, there was a wide market for brandy in this country, and in Europe as well, where there was a large demand for grape spirits for use in the manufacture of cologne.

The first business before the Convention on the sixteenth was the reception of the reports of the Committees on Wine Exhibits.

The Committee on Red Wines submitted the following:

Your committee would report that they found the wines submitted to them almost unexceptionally of good character—indeed, some wines deserve the highest praise.

We would add that the number of Medoc types was almost a surprise to your committee for the number and quality, causing them to note that we have already entered into a new era of wine production—the era of wines of the best Medoc types.

Among the large number of exhibits it was a subject of remark that there were only one or two specimens that did not come up to the standard.

The judgment of the committee on the samples submitted to them is as follows:

Zinfandel, 1888.—No. 1, J. P. Smith, Livermore. No. 2, George A. Bram, Santa Cruz.

Zinfandel, 1887.—No. 1, Purity Wine Co., San Francisco. No. 2, Los Gatos and Saratoga Wine Co., Los Gatos.

Zinfandel, 1886.—No. 1, I. DeTurk, Santa Rosa. No. 2, A. G. Chauche, Livermore.

Zinfandel (old).—No. 1, I. DeTurk, Santa Rosa. No. 2, I. DeTurk, Santa Rosa.

Burgundy, 1888.—No. 1, C. A. Wetmore, Livermore.

Burgundy, 1885.—No. 1, I. DeTurk, Santa Rosa.

Burgundy (old).—No. 1, C. A. Wetmore, Livermore. No. 2, C. A. Wetmore, Livermore.

Petit Bouschet, 1888.—No. 1, C. C. McIver, Mission San José.

Medoc, 1888.—Extra, George West & Son, Stockton. No. 1, C. A. Wetmore, Livermore. No. 1, C. C. McIver, Mission San José. No. 1, George West & Son, Stockton. No. 1, J. A. Stewart, Santa Cruz.

Medoc, 1887.—No. 1, Los Gatos and Saratoga Wine Co., Los Gatos. No. 2, C. C. McIver, Mission San José.

Medoc, 1886.—Extra, John T. Doyle, Cupertino. No. 1, C. A. Wetmore, Livermore. No. 1, C. C. McIver, Mission San José. No. 2, C. A. Wetmore, Livermore.

Cabernet Franc, 1888.—No. 1, C. C. McIver, Mission San José.

Malbec, 1888.—No. 1, J. P. Smith, Livermore.

Mataro, 1888.—No. 1, T. L. Fowler, Livermore.

Petit Pinot, 1888.—No. 1, H. B. Wagoner, Livermore.

Mondeuse, 1888.—No. 1, C. C. McIver, Mission San José.

Beclan, 1888.—No. 1, C. C. McIver, Mission San José.

Petit Syrah, 1888.—No. 1, C. C. McIver, Mission San José. No. 2, Charles Krug, St. Helena.

Tannat, 1888.—No. 1, J. P. Smith, Livermore.

Mataro and Zinfandel, 1887.—No. 1, J. L. Beard, Warm Springs.

Mondeuse (blend), 1888.—No. 1, C. C. McIver, Mission San José.

Respectfully submitted.

J. A. STEWART.
A. Y. CHAUCHE.
P. KLEIN.
RICH. S. HEATH.
E. DICHMAN.

The report of the White Wine Committee was as follows:

The committee appointed by you which had the white wines under consideration beg leave to submit the following report:

As an introduction, allow us to state how we proceeded in this difficult but pleasant task.

The wines were brought to us singly, numbered, and with name or type they represent, or are intended to represent, and also with the date of vintage; but without any indication of the owner's or maker's name. They were divided into three classes; one the Riesling, Gutedel, and Hock; the second, the Sauterne; third, miscellaneous or new varieties.

Thus the Rieslings of one vintage were compared and tested by themselves, and the same with each other variety and vintage; each member of the committee making his own mark and voting for the sample found first, second, and third best, while the inferior or defective wines were left out altogether. We are thus in the dark, as yet, who produced the best, but let us say that in most cases the committee was nearly unanimous on the best numbers, while they found several or a few instances, several samples that they had to class as No. 1, being about equal in quality. And here let us say that it affords us much pleasure to state as our unanimous opinion that we were surprised and delighted with the quality of most of the samples, showing great progress in the making and handling of the wines, as compared with the samples of former years, and foreshadowing a bright future for our white wines. Such wines as it was our privilege to taste are bound to make a market anywhere sooner or later, and to bring good prices.

The committee's classifications were as follows:

Riesling, 1888.—No. 1, C. C. McIver, Mission San José.

Riesling, 1887.—No. 1, C. C. McIver, Mission San José. No. 2, Charles Krug, St. Helena.

Riesling, 1886.—No. 1, H. W. Crabb, Oakville.

Riesling (old).—No. 1, I. DeTurk, Santa Rosa. No. 2, M. M. Estee, Napa.

Orleans Riesling, 1888.—No. 1, C. C. McIver, Mission San José.

Orleans Riesling, 1887.—No. 1, J. P. Smith, Livermore. No. 2, C. C. McIver, Mission San José.

Orleans Riesling, 1886.—No. 1, J. P. Smith, Livermore.

Hock, 1886.—No. 1, H. W. Crabb, Oakville.

Gutedel (old).—No. 1, H. W. Crabb, Oakville. No. 2, M. M. Estee, Napa.

Sauvignon, 1888.—No. 1, H. W. Crabb, Oakville.

Sauterne, 1888.—No. 1, H. W. Crabb, Oakville. No. 2, C. C. McIver, Mission San José.

Sauterne, 1887.—No. 2, Los Gatos and Saratoga Wine Company. No. 3, C. C. McIver, Mission San José.

Sauterne, 1886.—No. 1, C. A. Wetmore, Livermore. No. 1, A. G. Chauche, Livermore. No. 1, J. P. Smith, Livermore. No. 2, H. W. Crabb, Oakville.

Sauvignon Blanc, 1888.—No. 1, J. P. Smith, Livermore.

Muscadelle du Bordelais, 1888.—No. 1, J. P. Smith, Livermore. No. 2, Geo. Husmann, Napa.

Louisiana, 1888.—No. 1, Geo. Husmann, Napa.

Semillon, 1888.—No. 1, George A. Bram, Santa Cruz.

Semillon, 1887.—No. 1, George A. Bram, Santa Cruz.

White Burgundy, 1888.—No. 1. C. A. Wetmore, Livermore.

Chauche Gris, 1888.—No. 2, George A. Bram, Santa Cruz.

Chauche Gris, 1886.—No. 1, George A. Bram, Santa Cruz.

Burger, 1888.—No. 1, C. C. McIver, Mission San José; No. 2, H. B. Wagoner, Livermore.

Golden Chasselas, 1887.—No. 2, J. L. Beard, Warm Springs.

Golden Chasselas, 1888.—No. 1, Charles Krug, St. Helena.

Sauvignon Blanc, 1888.—No. 1, J. P. Smith, Livermore.

White Wine, 1887.—No. 2, Purity Wine Company.

(Signed):

CAPT. J. CH. DE ST. HUBERT.
N. E. ROSE.
WILLIAM RUEFF.
GEORGE HUSMANN.
J. P. SMITH.

The report of the Committee on Sweet Wines and Brandies was as follows:

Port, 1888.—No. 1, George West & Son, Stockton. No. 2, Mrs. De Wiederhold, Healdsburg.

Port, 1887.—No. 1, George West & Son, Stockton. No. 2, H. W. Crabb, Oakville.

Port (old).—No. 1, George West & Son, Stockton.

Sherry, 1888-1887.—No good samples found.

Sherry, 1886.—No. 1, George West & Son, Stockton.

Sherry (old).—No. 1, George West & Son, Stockton. No. 2, I. DeTurk, Santa Rosa.

Frontignan, 1888-1887.—No. 1, George West & Son, Stockton.

Muscatel, 1887.—No. 1, F. L. Fowler, Livermore.

Muscatel, 1886.—No. 1, Charles Krug, St. Helena.

Brandy, 1888.—No. 1, J. P. Smith, Livermore. No. 2, George West & Son, Stockton.
Brandy, 1887.—No. 1, George West & Son, Stockton. No. 2, Charles Krug, St. Helena.
Brandy, 1886.—No. 1, George West & Son, Stockton. No. 2, I. DeTurk, Santa Rosa.
Brandy (old).—No. 1, George West & Son, Stockton.
A collection of samples submitted by E. J. Baldwin, not for competition, consisting of Angelica, Muscatel, Madeira, Port, and Brandy, was highly commended.

Following the committee reports, John T. Doyle read a paper on "Legislation" as pertaining to the wine industry. He recommended that a law be passed permitting wine growers to use a pure wine stamp for their wines. By this means, the purchaser would be sure of receiving wholesome wine, and there would be no sale for impure or adulterated products. Congressman W. W. Morrow, ex-Congressman C. N. Felton, and others spoke of the probabilities of securing legislation in the direction stated by Mr. Doyle, and in the way of securing free brandy for fortification of sweet wines. In the evening, the Anaheim vine disease was considered, and Professor Ethelbert Dowlen, who has had charge of the investigation of the malady, delivered an address in which he recounted the progress and work of the disease, the experiments that have been made to discover its cause and find a remedy, etc., all of which have heretofore been published. Mr. Dowlen also exhibited specimens of the diseased vines with and without the microscope.

The seventeenth was devoted to discussion on the subject of "Possible Coöperation between Producers to Maintain Production on a Profitable Basis." T. V. Munson, of Denison, Texas, addressed the Convention on the native American wines, which he has studied for ten years. The Convention then adjourned *sine die*.

PRODUCTION OF WINE.

The production of wine has not increased to any extent since the final report made in 1887 by Arpad Haraszthy, formerly President of the Commission, nor is there any reason to anticipate any great increase within the next three or four years. During the years 1885, 1886, and 1887, the annual yield was increased to a great extent by reason of the vineyards planted after the revival of the wine industry consequent on the formation of this Commission, and the steadily increasing demand from the East. The yield of 1886, 1887, and 1888 was above the normal demand for those years, but the demand now equals the supply. The vintage for the past three years, beginning with where Mr. Haraszthy left off in his report, has been as follows:

1887	15,000,000 gallons.
1888	17,000,000 gallons.
1889	15,000,000 gallons.
1890 (estimated)	15,000,000 gallons.

Appended will be found a statement of the price of wine grapes paid during the vintage of 1889. These prices are perhaps as low as will ever be paid, the reaction in the wine market this year precluding such low prices during the season of 1890. Of course, the prices varied in different localities, but the following may be taken as representing average prices when local causes had no disturbing effect:

Cabernet	$25 00 to $40 00 per ton.
Petit Pinot	15 00 to 25 00 per ton.
Meunier	15 00 to 23 00 per ton.
Riesling	12 00 to 15 00 per ton.
Mataro	8 00 to 12 00 per ton.
Zinfandel	8 00 to 12 00 per ton.
Charbono	8 00 to 10 00 per ton.
Malvoisie	8 00 to 10 00 per ton.
Mission	8 00 to 10 00 per ton.

PRODUCTION OF BRANDY.

Within the past two years the production of brandy has assumed a relative importance in viticulture never before attained in the history of the development of the industry in California. Circumstances made the opportunity for distillers to compete with the foreign product exceedingly auspicious. Not only were the vineyards in the Charentes in France weakened by the attacks of phylloxera, rendering the French distillers almost unable to supply their own home market, but the price of grapes fell so low in California that the distillers were able to seize the opening which was presented. At present we are not only supplying the home market, but the East, and Germany and England are drawing heavily on our supplies. The distillation of brandy appears to have no limit except the inability of the distillers to obtain material upon which to work at sufficiently low prices to enable them to operate at a profit. Aside from the ordinary grades of brandy which are produced, the distillers are reaching for the better grades. The success of the State Viticultural Commissioners in securing a gold medal at Paris in 1889 for brandies, shows conclusively that the finer grades are within the reach of the careful and painstaking distiller. We have already produced brandies which challenge the admiration of the most noted experts who have examined them.

The records of the Internal Revenue Department afford the best statement of the total production of brandy. Prior to 1864, the department did not keep its records of brandy separate from the records of the production of whisky and other spirits. Even up to the present time no separate classification of the fruit brandies is attempted, and so the records for California include the distillates of peach and other fruit brandies as well as of grape brandy. These are so small, however, as not to materially affect the value of the following statistics of production, which were furnished through the kindness of Hon. John W. Mason, United States Commissioner of Internal Revenue:

FISCAL YEAR ENDING JUNE 30.	Proof Gallons.
1865	20,415
1866	74,773
1867	47,303
1868	152,418
1869	286,753
1870	169,791
1871	157,107
1872	211,916
1873	118,605
1874	99,680
1875	297,147
1876	142,799
1877	157,159
1878	318,071
1879	158,393
1880	238,928
1881	351,206
1882	502,513
1883	324,717
1884	295,039
1885	383,756
1886	402,121
1887	742,445
1888	953,580
1889	915,573
1890	1,072,957

It will be noticed from the above figures that there have been periodical increases and decreases of the production in this time of twenty-five years covered by the statistics. There is only one exception to this rule, and that is in the case of the past four years. Though the distilling interest increased enormously in these years, the demand was fully up to the supply, and the distillation of 1889–90 was undoubtedly the heaviest ever known.

Anticipating a trifle on the report of 1891, which is yet to come, I will state that up to the first of September of the present year one hundred and forty-nine distilleries had registered at the offices of the Internal Revenue Collectors for the distillation of fruit brandy during the season of 1890. These distilleries are found in twenty-eight counties, showing how widely spread the production has become. The distillers who registered up to that time, as furnished by Revenue Collectors W. H. Sears of the First District, and H. W. Byington of the Fourth District, are as follows:

FIRST DISTRICT.

No.	Name of Distiller.	Post Office.
3	F. Joost	Martinez.
4	Pironi & Slatri	Los Angeles.
5	Eugene Paris	Livermore.
11	L. J. Rose Co. (limited)	Los Angeles.
21	C. O. Rust	Anaheim.
29	Cucamonga Vineyard Co.	Cucamonga.
46	Secondo Guasti	Los Angeles.
51	Fernando Bessolo	Camulas.
71	Wm. Palmtag	Hollister.
101	Henry Lefranc	San José.
120	George West	Stockton.
141	Demarteni & Cereghino	Clayton.
158	Charles Stern	Los Angeles.
164	John Jasprizza	San José.
168	Baldwin Distilling Co.	Santa Anita.
172	Joseph Merithew	Cupertino.
175	Eisen Vineyard Co.	Fresno.
177	Charles Francois	Gilroy.
180	James Hennessy	San Francisco.
211	Timm J. F. Boege	Anaheim.
214	Nicholas Baravich	San José.
217	Herman C. Eggers	Fresno.
218	San Gabriel Wine Co.	San Gabriel.
220	Reinert & Weis	San Bernardino.
225	Fresno Vineyard Co.	Fresno.
226	Barton Estate Co. (limited)	Fresno.
228	Alexander Henry	Anaheim.
230	Hermann Boettcher	Los Angeles.
233	Gotlob Bayha	Yorba.
234	George Yung	Orange.
236	Pomona Wine Co.	Pomona.
237	Emile Vache	Brookside.
240	N. Anticovich	San José.
243	Joseph Young	Orange.
246	Gottardo Bustelli	Livermore.
248	Bernard Distel	Fremont.
250	Downey Vintage Co.	Downey.
251	Jacob Rudel	San Gabriel.
252	George Betz	Ramona.
254	Louis Schorn	Anaheim.
257	Sierra Madre Vintage Co.	Lamanda Park.
260	A. Poulain	San José.
261	Henry Wehmeyer	Anaheim.
263	C. K. Kirby	Fowler.
264	Hermann Granz	Fresno.
266	Paul O. Burns Wine Co.	San José.
267	Emerson W. Scott	Santa Clara.
277	A. Delpech	Patchin.
279	C. G. Anderson	Fresno.
282	Webster & Sargent	Minturn.
284	J. B. J. Portal	San José.
287	Los Gatos and Saratoga Wine Co.	Los Gatos.
288	Florence Winery	Florence.
289	Los Gatos Coöperative Winery	Los Gatos.
290	Paul Wack	Los Angeles.
291	Roscoe Winery	Los Angeles.
293	Pacific Wine Co.	San José.
297	Henry Mel	Glenwood.
299	Sierra Vista Vineyard Co.	Minturn.
303	Pacific Wine Co.	San José.
306	Henry B. Wagoner	Livermore.
307	Charles Detoy	Mountain View.
308	A. Zicovich	San José.
313	Santa Cruz Mountains Wine Co.	Santa Cruz.
314	Glen Terry Wine Co.	Clayton.
315	Buhach Produce and Manufacturing Co.	Atwater.
318	Theodore Beck	Santa Cruz.

FOURTH DISTRICT.

No.	Name of Distiller.	Post Office.
7	A. Douet	Amador County.
9	F. Borreo	Napa.
11	S. C. Hastings	Lakeport.
13	James Sweeney	Placerville.
14	J. Kimmer	Green Valley.
20	G. D. Endriss	Coloma.
21	George Hood	Santa Rosa.
22	J. D. Winters	Sonoma County.
24	P. & J. J. Gobbi	Healdsburg.
25	C. J. Dunn	Sonoma County.
26	George Lang	Calistoga.
33	E. C. Priber	Napa.
40	L. Rasmussen	Coloma.
42	Martin Feusier & Co.	Santa Rosa.
43	Henry Mette	Mormon Island.
45	B. Dreyfus & Co.	Sonoma County.
49	Kohler & Van Bergen	Guthrie's Station, Sac'to Co.
53	J. Laurent	St. Helena.
57	M. M. Estee	Napa.
58	E. M. Grimes	Napa County.
73	J. Dowdell	St. Helena.
78	J. Zentgraf	Shingle Springs.
82	Kortum & Fulcher	Napa County.
84	G. Sieber	Marysville.
85	G. M. Wubbina	Mormon Island.
87	C. P. Adamson	Rutherford.
90	Leland Stanford	Vina.
98	H. Hugot	El Dorado County.
103	California Distillery Co.	St. Helena.
104	J. M. Ramm	Camptonville.
108	Italian-Swiss Agricultural Society	Cloverdale.
113	A. Lancel	Occidental.
122	E. G. Furber	Cloverdale.
129	Kohler & Frohling	Glen Ellen.
131	J. F. Miller	Shasta County.
133	William Hill	Sonoma County.
137	M. J. Azeveda & Co.	Sacramento County.
142	A. B. Dresbach	Grass Valley.
148	A. Isoard	Nevada City.
152	C. Hellwig	Grass Valley.
158	M. S. Nevis	Sacramento.
159	J. Kaiser	Penryn.
161	E. A. Hood	Santa Rosa.
167	G. Engler	Sonoma.
168	Wm. Goldstein	Napa County.
169	Charles Krug	St. Helena.
171	L. Ponlin	Sonoma County.
186	A. Domeniconi	Sonoma.
187	Stamer Bros.	St. Helena.
192	E. W. Davis	Santa Rosa.
193	G. Groezinger	Yountville.
195	Walden & Co.	Geyserville.
196	C. Aguillon	Sonoma.
200	J. Oberti	Cordelia.
202	John Thoman	St. Helena.
207	C. Carpy	Napa.
208	J. Chauvet	Glen Ellen.
215	James Finlayson	Sonoma County.
216	Joseph Simi	Sonoma County.
219	R. F. Tilveria	Butte County.
221	G. F. Hooper	Sonoma.
222	Natoma Vineyard Co.	Natoma.
223	I. DeTurk	Santa Rosa.
224	La Roza & Nevis	Sacramento.
225	J. A. Prien	Napa County.
232	Orleans Distilling Co.	Orleans.
234	Beringer Bros.	St. Helena.
235	H. E. Weinberger	St. Helena.
237	J. Lonnibos	Sonoma.
240	C. Gundlach	Sonoma.

FOURTH DISTRICT—Continued.

No.	Name of Distiller.	Post Office.
243	Bouchou & Batemale	Cordelia.
245	H. Bolle	Sonoma County.
247	G. F. Fisher	Sonoma.
249	J. H. Wheeler	St. Helena.
251	Lay, Clark & Co.	Santa Rosa.
255	F. Sciaroni	St. Helena.
258	A. Korbel	Sonoma County.
261	P. Bieber	St. Helena.
263	John Benson	Oakville.

PRODUCTION OF RAISINS.

The planting of raisin grape varieties is going on at a rapid rate, and the time has come for the raisin producers and those contemplating becoming such to inquire whither this unusual haste to secure vineyards of this description will lead. A very careful study of the whole subject is being made by George West, the Commissioner for the San Joaquin District, with a view of ascertaining what the probable product will be when the many thousands of acres of new vines in the counties of Fresno, Kern, and Tulare are in bearing. His studies are directed towards averting, if possible, any over-planting, so that the raisin producers will not have the same difficulties to overcome as were encountered by the wine makers in 1887, 1888, and 1889. I desire at this point to call the attention of the raisin makers and the producers of grapes suited only to raisins, that up to the present there has been but little increase in the total consumption of raisins in this country—certainly none over what might be expected with the normal increase of population—and that practically every box of raisins from California has merely crowded out a box from abroad. In other words, there has been but little increase per capita in the United States in the consumption of raisins. Unless the prices of raisins become lower than at present, there is little prospect of there being any such increase. From the best sources of information obtainable, the following statement of the production of raisins in the State since 1873 is given:

1873	6,000 twenty-pound boxes.
1874	9,000 twenty-pound boxes.
1875	11,000 twenty-pound boxes.
1876	19,000 twenty-pound boxes.
1877	32,000 twenty-pound boxes.
1878	48,000 twenty-pound boxes.
1879	65,000 twenty-pound boxes.
1880	75,000 twenty-pound boxes.
1881	90,000 twenty-pound boxes.
1882	115,000 twenty-pound boxes.
1883	140,000 twenty-pound boxes.
1884	175,000 twenty-pound boxes.
1885	470,000 twenty-pound boxes.
1886	703,000 twenty-pound boxes.
1887	800,000 twenty-pound boxes.
1888	950,000 twenty-pound boxes.
1889	1,250,000 twenty-pound boxes.
1890 (estimated)	1,400,000 twenty-pound boxes.

From the statistics of the United States Bureau of Statistics of the Treasury Department have been collected the following figures showing the total imports of raisins into the United States, in pounds. These,

for purposes of comparison, have been reduced to twenty-pound boxes, though the bulk of foreign raisins come in twenty-two-pound (ten-kilogram) boxes. No figures can be obtained prior to 1884, at which time the Bureau separated raisins from the classification of "dried fruits." The imports for the fiscal years ending June 30th were:

YEAR.	Pounds.	In 20-lb. Boxes.
1884	53,702,220	2,685,111
1885	38,319,787	1,915,989
1886	40,387,946	2,019,397
1887	40,673,288	2,033,614
1888	40,476,763	2,023,838
1889	35,091,139	1,754,557
1890	36,914,330	1,845,716

Adding the California product in twenty-pound boxes, and the imports from abroad in the same unit, the result is the total American consumption. It results as follows:

YEAR.	Imported in 20-lb. Boxes.	California—20-lb. Boxes.	Total American Consumption—20-lb. Boxes.
1884	2,685,111	175,000	2,860,111
1885	1,915,989	470,000	2,385,989
1886	2,019,397	703,000	2,722,397
1887	2,033,614	800,000	2,833,614
1888	2,023,838	950,000	2,973,838
1889	1,754,557	1,250,000	3,004,557
1890	1,845,716	1,400,000	3,245,716

With these statistics in hand, the work of Commissioner West becomes doubly important. The investigation which he is making will place this Commission and the public in the possession of reliable statistics of the extent of planting in the three counties named, and supplemental to this will be the work of Commissioner Stephens in the northern raisin-producing districts, and Commissioners Rose and Shorb in the producing districts in the southern portion of the State.

DRYING WINE GRAPES.

During the vintage of 1888 a considerable quantity of wine grapes were sun-dried in various portions of the State, in the hope that a market could be found for them in the French establishments, which were making wine from dried grapes from Turkey and the Levant; and to a less degree in the eastern markets for dried fruit. These experimental lots were slow of sale at first, particularly in the East, but they were sold at prices that amply repaid the driers for their time and pains, considering the then low price of wine grapes.

Throughout the winter of 1888–9 the feasibility of opening new markets abroad was thoroughly discussed by the viticulturists, and in the spring of 1889 the Commissioners delegated Mr. J. B. J. Portal, of San José, then on his way to Europe on a business and pleasure trip, to investigate the French markets for dried grapes. Mr. Portal's several reports will be found in detail in another part of this report. While

not at all encouraging, the Commissioners, in having the investigation made, contributed largely to the knowledge of the importance to which the manufacture of such wines has attained. Early this season the Commissioners received a communication from a London commission merchant, offering $50 a ton for all the dried grapes laid down in French or North German ports. This offer was never accepted by the grape driers, who found that they could do better in their home markets.

The season of 1889 saw grape drying carried on on a far larger scale than in 1888; and early in 1890, when it was learned that there was a heavy shortage in the eastern fruit crops, the inquiry for these dried grapes rose to proportions never anticipated in the beginning. The demand has become so great as to seriously reduce the wine yield, but it is my own opinion that the culmination has been reached for the present. Grapes for wine making from the present outlook, will command a sufficiently high price at the wineries in 1891 to deter any extensive contracts for drying, such as were signed in the season of 1890.

THE ADVANCE OF THE PHYLLOXERA.

In the counties of Napa, Sonoma, and Solano, the phylloxera has continued its progress, and in many of the sections devoted to vine culture no efforts, beyond a few half-hearted and spasmodic attempts, have been made to check its ravages. Alameda County has a new center of infection, aside from the one at the University at Berkeley, at Mission San José, where, however, strenuous exertions are being put forth to prevent any rapid extension.

The full extent of the ravages during the past two years in the counties of Napa and Sonoma can scarcely be appreciated by those not familiar with the situation. Thousands of acres have been affected, and the loss of the vines will be the more severely felt now that the demand for our wines has caught up with the supply. Those vineyardists who neglected their vines on account of the temporary depression in the wine market, will have cause to regret their shortsightedness, now that the rise in wine has come.

I cannot too strongly urge upon vineyardists the absolute necessity of meeting the emergency the moment that the insects are discovered. All affected vines should be promptly pulled up and burned on the spot and resistant stocks of approved varieties substituted after the spot, where the vine has been, is left uncultivated for a year or two. If this plan is conscientiously adhered to, there is no reason why the reconstitution of attacked vineyards should not be carried on while the death of the old vines is in progress. This would make the change vastly easier on the vineyardists than to wait until all the vines are dead before replanting.

Years of experience have proved with us, as with the vineyardists of France and other countries, that the substitution of resistant stocks for the old vines is the only radical remedy. It appears impossible to secure unanimous and effective action in the application of bisulphide of carbon, or sulphocarbonate of potassium, without which action all attempts to check the disease must prove abortive. Submersion, with us, is generally impracticable or too costly in the sections where the phylloxera now exists. Were the pest to reach Fresno, for instance, or any other county where irrigation is practiced, this remedy would, with-

out doubt, be largely resorted to. In connection with this discussion about phylloxera, I would call attention to the recommendation of E. C. Priber, Esq., the Commissioner for the Napa District, to the effect that the Commissioners undertake to supply resistant stocks to all vine growers who desire them.

SWEET WINE BILL.

The passage of the long desired "Sweet Wine Bill," by which the producers of sweet wines are permitted the use of brandy for fortification free of internal revenue tax, is a subject for congratulation; and it is meet at this time that due recognition be given to Hon. Joseph McKenna, Congressman from the Third District, and others, for their long and persistent efforts to secure this boon for the sweet wine producers, and all wine makers generally. The clause permitting the use of grape spirits for fortifying dry wines for export must necessarily foster shipments of wines abroad, particularly to Europe, and there will soon arise a demand for neutral grape spirit to meet all wants in this respect.

The Commissioners have had a leading part in securing this desired legislation. The original "Sweet Wine Bill" was drawn by Hon. Charles A. Wetmore years ago, and on his first draft all other measures of the same sort have been based. The greatest victory was in obtaining the exclusive use of grape spirits for fortifying. This Commission has stood at times almost alone among all organized bodies, in resisting all overtures permitting the use of corn spirit, wheat spirit, or any other spirit not produced from the grape. This is one of the most important features of the bill, and by maintaining this position from the first to last in the five years' struggle to secure the passage of the bill, a substantial advantage has been gained for the wine makers, and for the industry generally.

WORLD'S FAIR.

It is proper at this time to call attention to the necessity of action this winter in taking the preliminary steps toward having the viticultural products of California represented at the World's Fair, in Chicago, by a suitable display. A petition should be sent to the Legislature from the Commission and other organized viticultural bodies, urging coöperation in all measures looking towards a satisfactory and creditable exhibit. This is a matter which should receive earnest attention from all classes concerned in viticulture, and the earlier that active work is begun the better it will be for us. It must be recognized that a suitable display cannot be picked up haphazard in the course of a few months.

DEMAND FOR PUBLICATIONS.

The demand for the publications issued by the Commission from time to time since 1880 is constant. Many of these publications are out of print and still the inquiry for them never relaxes. The Commission is in almost daily receipt of letters from California, and also from the East, Australia, France, Germany, Mexico, and other places, for complete sets of our reports and other printed matter. In view of this, I would recommend that many of these valuable documents, now unobtainable, be again put into print, that the work of the Commission shall be as thorough as possible.

STATISTICAL.

In his annual report to the Governor, filed April 12, 1888, Mr. Arpad Haraszthy, then President of the Commission, presented a very complete and exhaustive statement of the exports of California wines and brandies to various foreign countries by sea, to New York by water, and to the East by rail. These statistics have been carefully kept up since Mr. Haraszthy's complete statement was prepared, and the statistics corrected up to the first of January, 1890, will be found appended:

Receipts of wine and brandy from the interior were as follows:

Year.	Wine—Gallons.	Brandy—Gallons.
1887	8,496,344	256,104
1888	8,852,611	227,585
1889	10,523,504	517,243

The extent of the increase is shown by the fact that in 1875 the wine receipts were but 1,995,629 gallons, and the brandy receipts but 52,036 gallons.

The total wine shipments by sea and rail were as follows:

Year.	By Sea—Gallons.	By Rail—Gallons.	Total—Gallons.	Total Value.	Average Price.
1887	1,958,032	4,943,739	6,901,771	$3,140,305	$0 45.2
1888	*3,344,550	3,875,232	7,235,994	3,022,392	41.7
1889	†3,945,235	4,341,207	8,286,442	3,774,258	45.5

The total brandy exports, foreign and domestic, were as follows:

Year.	By Sea—Gallons.	By Rail—Gallons.	Total—Gallons.	Total Value.	Average Price.
1887	60,572	412,180	472,752	$774,313	$1 64
1888	85,120	365,960	451,080	690,152	1 53
1889	296,265	294,000	590,265	985,742	1 67

The exports of brandy are thus increasing at an enormously rapid rate, and were we to be permitted to bottle in bond, as was recommended by Mr. Haraszthy in his report, the exports would at once leap to such enormous quantities that the State's present production would be wholly inadequate to meet the demand that would at once spring up.

The detailed statement of the destination of the wines shipped by sea is as follows:

To New York.

Year.	Gallons.	Cases.	Value.
1887	1,680,227	1,335	$696,412
1888	3,052,755	1,244	1,266,200
1889	3,603,315	697	1,535,893

*And 6,485 cases, valued at $25,940.
†And 5,659 cases, valued at $24,971.

To Central America.

Year.	Gallons.	Cases.	Value.
1887	31,260	2,534	$34,654
1888	45,683	3,026	46,077
1889	44,769	2,781	43,639

To Mexico.

Year.	Gallons.	Cases.	Value.
1887	30,391	290	$20,023
1888	51,084	641	31,403
1889	52,358	767	33,543

To British Columbia.

Year.	Gallons.	Cases.	Value.
1887	13,313	215	$9,717
1888	12,782	342	9,563
1889	12,800	471	11,388

To Hawaiian Islands.

Year.	Gallons.	Cases.	Value.
1887	71,150	612	$62,877
1888	66,667	492	56,434
1889	99,537	501	77,159

To Japan.

Year.	Gallons.	Cases.	Value.
1887	28,378	526	$16,401
1888	30,266	214	14,106
1889	22,710	117	10,571

To Europe.

Year.	Gallons.	Cases.	Value.
1887	26,355	1,642	$20,562
1888	62,662	248	36,112
1889	51,305	260	25,304

To All Other Countries.

Year.	Gallons.	Cases.	Value.
1887	57,404	669	$29,138
1888	22,660	278	12,404
1889	28,441	65	15,489

The total exports of brandy to foreign ports by sea were as follows:

Year.	Gallons.	Cases.	Value.
1887	26,899	639	$36,154
1888	30,308	263	21,450
1889	82,102	----------	55,697

It is not out of place to give here the imports of foreign wines and brandies at San Francisco during the past three years. It will be noticed that there has been a decrease in the quantity of still wines imported in casks, showing that California wines in bulk are slowly driving out the imported article. The imports of still wines in bottles, and of brandy, show a slight increase. Champagne imports have increased heavily, not that the sales of the domestic article are suffering, but on account of the enormously increased competition and activity of the agents of the foreign producers. Appended are the figures:

Still Wines in Casks.

Year.	Gallons.	Value.
1887	102,628	$70,464
1888	106,127	75,320
1889	91,954	72,239

Still Wines in Bottles.

Year.	Dozen.	Value.
1887	15,083	$58,201
1888	17,078	73,098
1889	23,848	84,587

Champagne and all Sparkling Wines.

Year.	Dozen.	Value.
1887	10,617	$135,492
1888	20,116	274,213
1889	19,747	270,911

Brandy.

Year.	Proof Gallons.	Value.
1887	20,253	$50,330
1888	29,494	66,067
1889	33,001	73,785

NEEDS OF THE COMMISSION.

At this time, when the tide has turned favorably for the wine makers, the Commission is in a position to do valuable service for those engaged in this branch of the viticultural industry. The Commission, as the recognized head of the classes who cultivate the vine, is looked to for information of all sorts, technical and other, for advice regarding legislation, whether State or national, and for information for the general public. It has the confidence of the vineyardist in every section and every valley, and its labors are appreciated by every class of producers.

To enable us to continue our work in behalf of the grape industry during the two fiscal years beginning July 1, 1891, the same appropriation as was passed by the last Legislature, viz.: $35,000, will be required.

Respectfully,

I. DeTURK,
President.

PROGRESS REPORTS

OF

JOHN H. WHEELER AND CHARLES A. WETMORE,

Chief Executive Officers.

REPORT OF JOHN H. WHEELER.

Read at the annual meeting, held June 9, 1889.

To the Board of State Viticultural Commissioners:

GENTLEMEN: In accordance with your instructions given me at the last regular meeting of the Board, I have made inquiry and investigations to determine the existence and extent of the vine disease, now commonly called the Los Angeles disease (now the Anaheim disease), in the northern vineyards of the State. At the time of this writing it seems safe to so denominate this evil, for its ravages, so far as I can learn, have been confined to Los Angeles County.

Soon after your last regular meeting, I sent circulars of inquiry to the vineyardists of the north, describing, in popular language, the manifestations which characterize the dying vines in Los Angeles County, warning vineyardists at the same time to carefully examine their vineyards and report to me any trouble similar to that described. Specimens from the diseased vines were asked for, to be sent me accompanying such reports.

In answer to these circulars, my attention was called to many other minor troubles encountered in the vineyards, but very few reported anything similar to the disease sought. Samples were sent from Sonoma, Napa, and Santa Clara Counties, which I forwarded to Professor Dowlen, the duly appointed specialist of the Board. He found on all the specimens a fungus identical with that existing on the diseased vines of the south.

My interpretation of Mr. Dowlen's reports, as a whole, leads me to understand that this fungus, which is common to all of the diseased vines of Los Angeles County, is the agent which performs the finishing work of destruction, though, perhaps, rendered more potent by antecedent causes not yet known or described.

The theory is amply proved:

First—In that the application of a fungicide arrests the decline of the affected vines, causing an apparent revival of the plant, which, however, falls again into a decline if left too long without a renewal of the application.

Second—In further support of this theory, I visited a number of our northern vineyards, from which samples were procured from apparently healthy vines—vineyards which at this time are in a magnificent state of vegetation and production. The samples, however, were taken from vines suffering from known causes or weakness, induced by causes other

than disease. For instance, the canes growing from a spur nearly severed from the vine by the cultivator formed one sample; a late growing sucker lying on the ground, and consequently frosted before maturity, made another; a rank eucalyptus invaded a small part of the territory of an otherwise healthy vineyard, thus weakening a few vines growing near. Samples were taken from these impoverished subjects, etc. On all of these specimens the fungus common to the diseased vineyards of the south was found, thus proving that the final agent of destruction exists in the north, awaiting only to succeed to other weakening causes to accomplish destruction similar to that produced in the south. The primeval cause may not, however, and it is to be hoped that it will not, ever come to the vineyards of the north.

In order to reconcile my work in the northern vineyards with that of your special committee, Commissioner J. DeBarth Shorb, of Los Angeles County, I have recently visited the vineyard districts of the southern counties, and examined the work of Professor Dowlen, who is making special investigations at San Gabriel. This gentleman I must, in passing, commend to the Board as an earnest, conscientious student, whose efforts are characterized thus far by a manifest determination to be accurate, and to sacrifice all hypotheses and theories to an absolute determination of facts by systematic analysis.

With Professor Dowlen I visited many vineyards in Los Angeles County, and inspected the other districts alone. A careful examination of the vineyards of San Diego County failed to reveal any cause for alarm in that section. The raisin vineyards of El Cajon possess unusual vigor and show no sign of suffering from any cause, except be it want of system in pruning.

The vineyards of San Bernardino County were also found in a very magnificent state of early vegetation, with no manifestations of disease. I carefully inspected every vineyard about Riverside, for the fungus mentioned before in this paper had been found at Riverside, but found no deathblow dealt by it in this section.

In Los Angeles County, however, a close inspection was not necessary to reveal the common prevalence of the malady throughout its whole extent. I found no vineyards exempt from the trouble, and an examination of the wild vines near San Gabriel confirmed the report of Professor Dowlen as to their perishing in like manner with the cultivated vines.

In my judgment, the first cause of the evil is yet to be found, and until then vineyardists must operate with the Bordeaux mixture or the powder proposed by Mr. Shorb, to prevent the fungus found from accomplishing its final work.

The report of one vineyardist examined is terse and significant. During the summer this proprietor had noticed the languishing of the terminal leaves and buds of his vines, in a manner that signalized the approach of the evil. The prompt application of the weak Bordeaux mixture of lime and copper immediately revived them. Two weeks after they were noticed to languish again. A repetition of the first treatment again completely resuscitated them. This and other similar experiences noted and reported by Commissioner Shorb are sufficient to bring about a common reliance on the proper fungicides for ameliorating the condition of the suffering vineyards.

I found that the reports of the extensive ravages of the evil in Los Angeles County had not been exaggerated. The Santa Ana Valley,

which once blossomed over with over five thousand acres of healthy and profitable vineyards, possesses less than five hundred acres to-day, and these in a suffering and apparently despondent condition. Commodious wineries, which once sounded with the busy hum of the joyful vintage, are now idle and silent. Professor Dowlen has already given to the public the order of resistance of many varieties of vines, one instance of which we observed together, and which I regard as worthy of special mention. The American varieties show a handsome growth and continue in good bearing in the midst of *viniferas* which have entirely perished.

If desirous of growing grapes of such quality, the proprietors may safely plant the Lenoir or Isabella in the affected region, securing healthy stocks, and favoring the vines with deep, heavy soil, choosing spots where summer irrigation is unnecessary.

The vineyardists of the afflicted region will be slow to replant their land to vines, though many are anxiously waiting and expecting to do so. For the benefit of these, I would suggest to Mr. Shorb and the Board the advisability of planting and maintaining an experimental vineyard in the midst of the diseased region, selecting for propagation those varieties which have proved most resistant, and are alike desirable, being careful to obtain all vines used for the purpose from districts totally exempt from damage by this cause. For whatever may be the original cause of the vines weakening, another century may now elapse without its recurrence, the probability of which is attested by the fact that the old vineyards have not before suffered from its attack.

Returning to my report proper, I can see no cause for general alarm in the north about this particular evil, for a diligent search has failed to reveal any vineyards, or even parts of vineyards, affected in the manner of those in Los Angeles County.

It was my desire and intention to visit the vineyards of Fresno and other central regions of the State, after becoming familiar with all phases of the disease in the south, but the limited time accorded me for completing this work proved insufficient.

In closing, I will state concerning the methods of producing tannin for the use of wine makers—which I was instructed to investigate—that I have written to proper authorities in France to secure their experience in the matter, the response to which letters will doubtless soon reach my successor for your use. For reports on other matters I must refer you to the appendices which have been issued from time to time, and to the correspondence had with vineyardists and newspapers, which of late has become more voluminous than I have known it before. The latter, if examined, will show a proper and commendable reliance on the Board in its labor of assisting vineyardists to overcome their many obstacles.

Very respectfully,

JOHN H. WHEELER,
Chief Executive Officer.

SAN FRANCISCO, April 30, 1889.

REPORT OF CHARLES A. WETMORE.

Read at the semi-annual meeting, held December 9, 1889.

To the Board of State Viticultural Commissioners:

GENTLEMEN: A regular meeting of this Board is now in progress. Questions relating to the proposed legislation affecting viticultural interests will necessarily come before you for consideration, and in anticipation thereof I respectfully submit a brief discussion of our past efforts and the nature of difficulties encountered, together with suggestions as to future demands and policy of action.

THE SWEET WINE BILL.

This measure commands immediate attention and most careful consideration of policy.

The object to be attained should always be clearly stated and kept distinct from all possible complications. Stated simply, the producers of pure sweet wines desire to be relieved from internal revenue taxes on the pure grape spirits necessarily used in fortification at the place of original production. The fortification of any wines, free of tax, for exportation to foreign countries, only at the time of departure is another question much simpler in dealing with.

Our producers have in the past considered the several side issues raised when presenting their demand for relief on sweet wines, and have repeatedly announced the policy which our delegation in Congress should pursue. The whole industry is in sympathy with the producers of sweet wines, yet it demands that no concession to other interests shall be made in order to procure the desired relief, if such concession will be injurious to the permanent prosperity and welfare of all concerned. The principles on which all can stand and work together must be positively adhered to, and advice should be so given in unmistakable words to our Representatives and Senators in Congress. The most important of these principles are the following:

1. Every effort must be made to resist any attempt to abolish the Internal Revenue system.

2. No reduction in the general tax on distilled spirits, intended for use as beverages, should be permitted, with the single exception of the possible partial reduction on fruit syrups—so limited, however, as only to equalize cost of production for grain and fruit spirits. The abolition of the tax on fruit brandies should be religiously opposed as a measure dangerous in the extreme.

3. That an increase in the tax on distilled spirits would greatly benefit not only all pure wine producers, but also the moral tone of the entire liquor traffic, should be constantly remembered.

4. That the market value of alcohol controls the average market value of all ordinary wines should be considered a fixed principle not to be overlooked at any time.

5. The relief demanded by sweet wine producers should be granted, but strictly limited to producers at the original places of fermentation, to a stated quantity not exceeding 14 per cent of alcoholic strength; wines so fortified not to exceed 24 per cent and not to contain less than 4 per cent of saccharine matter; no use of saccharine matter other than the

pure product of the grape to be recognized as legitimate, excepting pure crystallized cane sugar, and no spirits for fortification to be free from tax excepting pure grape distillates. These limitations are absolutely necessary to prevent demoralization of the whole industry through the temptations to fraud, deceptions, and adulterations. Producers of pure wines who ferment their own products should be permitted to procure grape brandies out of bond for fortification, subject to careful supervision of Internal Revenue officers to prevent fraud; this provision being necessary to satisfy wine makers who have no distilleries, and especially to promote harmony between producers in different States.

6. The advantage to be gained by obtaining the privilege to fortify sweet wines free from taxation would not compensate for the harm that would be done by violation of any one of the principles stated above, or by failure to enforce any of the limitations and restrictions mentioned.

The present condition of affairs is a lamentable one, but the difficulties under which we suffer, and the advantages to be gained by relief for sweet wines, should neither be exaggerated nor carelessly stated.

Under the laxity of the revenue laws applying to distillers of grape brandies, fraud in fortification of sweet wines can only be partially suppressed, and collusion with revenue agents can be practiced without fear of detection. The justice of the demands of the producers and a liberal interpretation of true intent of the law have in the past influenced the national administration to such an extent that very little attempt has been made to prevent the use of brandies by distillers in legitimate fortification of sweet wines. This overlooking of the strict letter of the law has, however, done more to demoralize the industry than strict enforcement can do harm. The majority of wine makers have not dared to assume the risks of acting under implied, but unauthorized, permission to do otherwise than as the law requires. Producers have not reaped profit from the situation. Wines have been offered in competition of trade in accordance with the cost of production. Those who have fortified at least cost have sold correspondingly low, and thereby made it impossible for others, who have been more scrupulous, to enter the market or to purchase tax-paid brandies for fortification. In some cases wine makers who were compelled to make sweet wines owing to overripeness of grapes, have been equally compelled to purchase grain alcohol for fortification, because it has been cheaper than tax-paid brandy. If the law had been strictly and continuously enforced, no doubt there would have been some diminution in the production of sweet wines; but the quality on the market would have been finer, different producers would have been engaged in it, and the prices would have been higher. The low prices of the past have benefited only the eastern jobbers.

The stringent enforcement of the law under the present administration has caused some good as well as some bad results; but worst of all is the tendency towards a general attack on the Internal Revenue system.

It has done good in compelling sweet wine producers to unite in demanding a change of the present law; also in bringing up the price of sweet wines so that legally made products may be profitably offered. This of itself, if continuously and honestly adhered to by the Government, will partly relieve our wine makers from necessity to use grain alcohol when they have no distilleries. The increase of price will, however, without doubt limit our production by rendering competition more difficult; the increase of revenue to the Government is not desired by

the people; in fine, the situation, while better than under unauthorized license, is not one of which Congress may feel proud. There is, however, no confidence in the permanency of the present policy of the Government, and there can be no guaranty of honesty on the part of its agents. Even now, doubts are freely expressed as to whether all wineries where sweet wines are made are equally supervised. The opportunity for collusion without fear of detection is certain to produce fraud, and no matter how pure the intentions of the Washington office may be, the people will believe that agents appointed through political influence will exercise favoritism more or less.

We cannot continue under these conditions of affairs without either one of two remedies being applied, viz: to enforce the letter of the law impartially, the Government must assume greater control of all fruit distilleries, appoint storekeepers, etc., or the right to fortify without tax must be granted. The first of these remedies would be costly to the Government and would necessarily restrict the number of distilleries, and so break up all the small producers for the benefit of a few rich men. Rather than to permit this result, viticulturists would prefer that the Government should simply tax all wines for the proportion of alcohol contained exceeding 14 per cent, taking no account of grape spirits at distilleries reconverted into wine. This might in some respects be the best of all remedies, because no tax-paid grain spirits could be used. The Government will not, however, give any consideration to new laws having in view the increase of internal revenue collections, as such are not needed.

Revision of Customs and Internal Revenue laws is the avowed policy of all parties, and the object is reduction of revenue; therefore, the present demand of sweet wine producers is in full accord with the governmental policy of the country, and no unreasonable opposition need be feared if our industry does not carelessly disturb other interests and political systems.

It is not because we ask relief from taxation that serious opposition is encountered, but because in asking such relief the method of obtaining it involves complications that are apparently difficult to harmonize.

In the first place, the system of collecting internal revenue is easily jostled by changes that give cause to fear openings for fraud. It is therefore absolutely essential that experts in the service shall be fully satisfied that the provisions of any new law relieving one class of producers from taxation shall not contain loopholes for a perversion of its true purposes. To this end the Commissioner of Internal Revenue becomes necessarily, by being called upon by committees of Congress, an important factor in framing the new law to suit the new demand. When our Commission presented the Sweet Wine bill and Pure Wine bill to Congress, it was the advice of Commissioner Miller and his assistants that was first demanded by both the Democratic House and the Republican Senate. With his aid bills were framed, which he was ready to approve as "operative for the purposes intended"—leaving no suspected loopholes for fraud, notwithstanding he objected to the general policy of passing them. During the future terms of Congress our producers must meet this same difficulty, for it is practically impossible to secure the assent of Congress to a bill which is reported by experts to be "inoperative," although Congress may override the opinion of the administration on a question of policy.

There is no reason to suppose that any organized hostility exists anywhere in this country against our industry, unless it be in the ranks of Prohibitionists. There is no reason to believe that a Republican protective tariff party desires to enlarge the scope of internal revenue influence. There is in reality no whisky ring; no ring of any kind to fear, although there may be in some parts some conflicts of interest. The Fractional Gallon bill, to which the first draft of the Sweet Wine bill was attached as an amendment, was favored by the distillers of Peoria, opposed by those of Cincinnati, and was a matter of indifference to those of Kentucky. Our Sweet Wine bill was warmly favored by Kentucky, Tennessee, and Maryland distillers, also by the pure wine makers of Virginia, North Carolina, and New York; opposed by the neutral spirit producers of Illinois, and the compounders of bogus wines of Ohio, and was a matter of practical indifference to the distillers of Cincinnati. The Peoria distillers happened to have special influence over Mr. Morrison through their local Representative, and that is the only reason the bill was not concurred in as an amendment to the Fractional Gallon bill. A very little trouble in conference with the Peoria distillers would have convinced them that they had nothing at stake worth fighting for; but the usual Granger fight occurred here just at the critical time, and nothing was done to complete a victory more than half won. The situation has not changed, except for the better. Now the committees of both Houses of Congress and the Treasury Department are in harmony politically, and it would be folly for our producers to work up a false excitement directed against the motives of the Administration, or in sympathy with those who would be glad to gain strength in favor of the abolition of the internal revenue system.

Recollect that when a Republican Congressman advocates abolition of all taxes upon distilled spirits, he is making more friends among Prohibitionists than among wine makers or distillers. Recollect, also, that when a serious outcry is made against the entire internal revenue service, it is very pleasing to a certain extreme school of Protectionists, who see in such a policy an easy road to overcome threatened dangers to the tariff.

It is more than probable that the demand for a rigid enforcement of internal revenue laws applicable to sweet wine came from some of our own producers, who found themselves unable to compete with illicit production. And we have more men to fear in this State who view vine growing and wine making only as a temporary speculation than we have active enemies among whisky distillers. There is now a disposition among some who are influential to trifle with the principles upon which our permanent prosperity depends. The man who would please both the Prohibitionists and the wine makers in such questions must be considered an unsafe leader for us. The man who will risk the greater interests of the whole industry to gain temporary relief for a small branch of our work must be invited to counsel with the whole body of producers before he is permitted to announce our policy.

I would suggest, therefore, that this Commission should call a Convention as soon as possible to determine, first of all, what general principles must be preserved at all hazards, and to lend collective aid to the sweet wine producers; also, that the sweet wine producers form an association to further their special wants in harmony with the interests of the whole, and that such association shall first disavow any intention of fostering any party opposed to the maintenance of the internal revenue service.

Respectfully submitted.

CHARLES A. WETMORE.

REPORT OF CHARLES A. WETMORE.

Read at the annual meeting, held June 9, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: By limitation of office, my term as Commissioner for the San Francisco Viticultural District has expired, and with it my position as President of your honorable body, although I still remain your Executive Officer by election of the Board of Commissioners. I desire to express my most sincere appreciation of the courtesy and confidence with which I have been uniformly treated as your presiding officer during the past two years.

As retiring President, I have no report to offer; as Executive Officer, I shall be ready to file my report as soon as I have completed certain revisions now being made, which pressure of other matters has delayed.

The most important question which has recently arisen requiring your serious attention is that involved in the late decision of the United States Supreme Court and the legislation now pending in Congress relating to interstate control of fermented and alcoholic liquors in unbroken packages passing into States where prohibition laws prevail. Very urgent appeals have been made to secure the influence of California against the passage of the pending bill to relegate to the States the entire control of this so called temperance question. Upon retiring from office as your President, I can think of no more important suggestion than this, viz: that the State Viticultural Commission of California should immediately direct its officers to urge the California delegation in Congress to favor the passage of the pending bill authorizing the several States to control the sale of fermented and alcoholic drinks, free from all interference on the part of the National Government. This question should be one of State control, and all differences of opinion should be suffered to be subject to State legislation. The defeat of the pending bill would result in national agitation, unwholesome and unnecessary.

A very general demand has been made by producers for an extension of the system of exhibiting viticultural products and private brands to important trade centers, such as New York, Chicago, and London. The plan adopted for the Platt's Hall exhibit, might, with some modifications, be followed in those cities as rapidly as the funds of the Commission permit. This method of popularizing our products is exceedingly popular and useful, and is opposed only in the interest of a few wholesale dealers who desire to monopolize all the profits of the industry. I am of the opinion that a special committee should be appointed as early as possible to take this question under consideration, or special instructions should be given to the Executive Committee expressing the future policy of the Commission in this respect.

Considerable indignation has been expressed by producers against the public charge, made by the California agent of the Agricultural Department of the National Government, Mr. George Husmann, reflecting upon the future prospects of California clarets. At a public Convention in San Francisco, from a written paper, he made the statement that "California would never excel in her clarets." This assertion, coming from one supposed to be in authority, in the face of the great success already achieved by our growers, is exceedingly offensive, as well as unjust, and should be repudiated by the United States Department of Agriculture.

In conclusion, I am happy to be able to congratulate producers upon their improved prospects for profitable markets. New elements in trade are being developed rapidly, and foreign markets are being tested by public spirited merchants, whose policy will be to grade and purchase our wines in accordance with relative merits. The depression that has prevailed during the last two years cannot continue much longer.

CHARLES A. WETMORE.

REPORTS OF CLARENCE J. WETMORE,

Manager of the Hall and Experimental Cellar.

FIRST REPORT.

Read at the annual meeting, held June 11, 1889.

To the Executive Committee of the Board of State Viticultural Commissioners:

GENTLEMEN: As Manager of the Permanent Exhibit and Experimental Cellar, I respectfully submit the following report, showing the work that has been accomplished up to the present time.

When the Commission decided to open a permanent exhibit of viticultural products, the store under the Mechanics' Library, on Post Street, was selected as the place for holding such an exhibit. After consulting with the Trustees of the Mechanics' Institute, the idea of taking the store mentioned was abandoned, owing to the many restrictions placed upon us, which if agreed to would have made it impossible to carry out our plan of work. After looking around for some time for another place, your committee decided to rent Platt's Hall, at a rental of $350 per month. Upon receiving word from the Attorney-General that it would not be lawful for the Commission to sell wines or brandies on its own account, your committee decided to lease a portion of the hall for a café, in which wines on exhibit would be sold to those wishing to sample them.

Acting on instructions from you, I had the hall fitted up for occupancy. On the right of the hall offices were made for the use of the Commission, and a portion partitioned off for an exchange. On the left a portion was partitioned off for a café, and back of it a place was made to store the samples for use in the café. In the main center of the hall wire frames were placed, on which the samples sent by exhibitors were displayed. The cost of fitting up the hall was as follows:

Fixtures	$445 00
Carpenter's bill	1,419 00
Plumbing	152 38
Painting	263 85
Vineyard scene	125 00
Wire frames	176 00
Furnace, etc.	283 91
Total	$2,865 14

While the hall was being fitted up I sent out a circular to all the leading wine makers and merchants of the State. In answer to the circular thirty-five exhibitors have placed their wines and brandies on exhibition, and thirty-three of them have them on the wine list used in the café. Besides the samples of wines and brandies, there are exhibited a continuous still, fermenting and storage tanks, vineyard plow, wine pumps, combined stemmer and crusher, wine presses, elevator, corking machines,

bottle-washing machine, capping machine, corks, capsules, bottles, clarifying material, demijohns, etc.

Before opening the hall the café was leased to Mr. Pierre Klein, proprietor of the Occidental Restaurant, at a rental of $50 per month. The hall was opened on January fifteenth, and Mr. Klein paid $25 for the half month ending January thirty-first. It was then found that the profits derived from the sale of wines, being 10 cents for pint and 20 cents for quart bottles, was not sufficient to warrant him in paying such a rent; so no rent has been charged him since February first. The business of the café has been slowly but steadily increasing, but the profits are not yet sufficient to warrant the lessee in keeping it up, and a short time ago he signified his intention of leaving. A meeting of your committee was called on March thirtieth, and you agreed to allow him 20 per cent of the case prices on all sales made in the café, and to be allowed on sales from August first; this 20 per cent to be in addition to the service charge. On these terms Mr. Klein agreed to stay, and the café is still running.

You will see from the following figures that the popularity of the café has not decreased, but rather increased:

Bottles Sold in—	Number.	Corkage.	Cash Receipts.	Reserve Fund.
January	504	$60 10	$180 30	$42 50
February	572	61 40	196 10	
March	606	62 85	200 45	24 55
April	634	65 45	235 25	29 80

The Reserve Fund is the difference between the price per single bottle, after deducting the service charge, and the case price charged for one dozen bottles; out of this Reserve Fund the bills for printing the wine list are paid. About three hundred a month are printed and distributed to persons visiting the hall. Since the opening of the café, a great many eastern wine merchants have visited it, and have found out, by sampling the wine there, just the wines they wished to purchase. Others have been surprised at the fine wines exhibited there and have decided to go into the wine business. Residents of this city and Oakland, by visiting the café, have found out the brands of wine that suit their tastes, and are now regular customers of the exhibitors of those wines. One party ordered a pint bottle of nearly every wine on exhibition and had the lot sent to New York to be sampled there. These few instances show the good work the café is doing and demonstrate plainly that it must be kept up. The money received from the lessee of the café is deposited in the Anglo-Californian Bank. An account is rendered to the exhibitors every two months, and a check given for the amount of their sales.

Those parties who take an interest in the success of the café and come there often with their friends are the ones that reap the most benefit from it, as is shown by the sales made of their wines. Some of the exhibitors never enter the café, and seem to give it the cold shoulder. They do not seem to realize the fact that we are furnishing the best advertising medium possible, and at no expense to them. Those that try to make the place a success will reap the benefit in the end.

The plans for operating the Exchange Department have not as yet

been perfected. Your committee appointed a special committee, consisting of Arpad Haraszthy, H. W. Crabb, and I. Landsberger, being one merchant, one producer, and one broker, to draw up such rules as they thought best for operating this department. This committee met several times, but could arrive at no conclusions. It is hoped that something will be done soon to place this department in running order. A number of producers have made use of the lockers in the Exchange, and have placed their samples in them, and a few have effected sales. In this department I am prepared to test, free of charge, the amount of alcohol or acids in wines. So far I have tested twelve samples for alcohol.

READING—ROOM.

In the center of the hall a place is laid off for a reading-room. Country newspapers and periodicals are kept on file for the convenience of those wishing to use them.

EXPERIMENTAL CELLAR.

In the cellar connected with the hall a place was fixed to store the wines we had collected, and which, up to the time of occupancy of this hall, were stored in a cellar at Clay and Leidesdorff Streets. Most of the wines are in good condition, but the dry cellar is showing its effect on the white wines, and some of them are taking on a slight sherry flavor. It is very evident that white wines cannot be aged in such a cellar. I have no doubt but that good sherries can be made in our cellar, and would suggest that a room be fitted up for that purpose where the temperature can be raised above what it is now. Most of the wines in the cellar will need to be bottled before the end of the year, and for that purpose several thousand bottles will be required.

Last January I sent to the Paris Exposition, through the Department of Agriculture at Washington, D. C., two bottles each of the following wines and brandies in our cellar:

Zinfandel—1886 and 1887.
Mataro—1886 and 1887.
Carignan—1886.
Mondeuse—1886 and 1887.
Petite Syrah—1886.
Cabernet Franc, Cabernet Sauvignon, and Verdot (blend)—1886.
Cabernet Franc, Cabernet Sauvignon, and Merlot (blend)—1886.
Cabernet and Tannat—1886.
Burgundy—1886.
Petit Pinot—1887.
Johan. Riesling—1886.
Franken Riesling—1886.
Sauvignon Vert—1886.
Chablis—1886.
Sauterne—1886.
Semillon—1886.
Chauche Gris—1886.
Meunier—1886.
Port—1886.
Brandy—1883 and 1886.

The samples were all labeled and marked No. 1, 2, 3, etc., with a record kept showing what wines corresponded to the numbers, so that if any mention is made of number due credit can be given the proper one.

Respectfully submitted.

CLARENCE J. WETMORE,
Manager.

SECOND REPORT.

Read at the semi-annual meeting, held December 9, 1889.

SAN FRANCISCO, December 9, 1889.

To the State Viticultural Commissioners:

GENTLEMEN: As Manager of the Hall and Experimental Cellar, I beg leave to submit the following report:

It is now eleven months since the Permanent Exhibit and Viticultural Exchange was established in Platt's Hall, and I am happy to say that the undertaking has been a great success. Since making my last report six more exhibitors have placed their wines and brandies in the hall, while not a single exhibitor has withdrawn his exhibit. There are at the present time forty-one exhibitors, of which thirty-nine have their wines for use in the café. Alameda County has four exhibitors, Napa County eight, Sonoma County three, Santa Clara County five, Fresno County three, San Joaquin County one, Los Angeles County three, and Santa Cruz County two. Of the wine merchants who do business in San Francisco, eight of them have their exhibits in the hall.

The business of the café, although falling off for a few months, has kept up well, and the sales for November were the largest of the year. If all the exhibitors would take more interest in the success of the café, the place could be made one of the best distributing mediums in the State. Every facility is given exhibitors to show their samples and make sales, and those who have given the most attention and helped to keep up the success of the café have reaped the most benefit. A great many cases of different samples of wines and brandies on exhibit have been ordered sent to people in the East. One lot of seventeen cases was sent to a party in Washington, D. C., and he has written back that he is now better pleased with California wines than he ever was before. The following table will show the monthly sales made through the café during the eleven months of the year:

MONTH.	No. of Bottles Sold.	Amount Received.
January	503	$240 40
February	514	257 50
March	537	263 30
April	547	300 70
May	411	218 00
June	317	162 95
July	328	173 95
August	331	170 90
September	298	161 50
October	614	281 15
November	617	282 90
Total for eleven months	5,017	$2,513 25

The money was distributed as follows:

Corkage	$505 70
Reserve Fund	204 75
Twenty per cent of case prices given to café	216 70
Paid to exhibitors	1,310 70
Freight and express charges	44 50
Balance due exhibitors	230 90
	$2,513 25

From the Reserve Fund, $84 75 was paid for printing the wine lists and $4 90 for ice, leaving a balance of $115 10. From three to five hundred wine lists are printed monthly and distributed to the people visiting the hall. I would suggest that a portion of the Reserve Fund be used in advertising the exhibit, so that strangers coming to San Francisco may be posted on what we are doing.

Plans for carrying on the Exchange Department have not yet been perfected. Quite a number of the lock boxes are used by producers to store their samples in, and a few sales have been made. In this department during the year I have tested fifty-five samples of wine for alcohol, which have been brought or sent to me from different portions of the State. Tests were made free of charge.

The wines in the Experimental Cellar have been cared for, and some of them bottled. During the past vintage I fermented two hundred and fifty pounds of Palomino grapes, and three hundred pounds of Pedro Ximines grapes, which were sent to me by E. W. Maslin, of Placer County. The wine made from the grapes I have kept separate, and will convert it into sherry. I also fermented two hundred pounds of Semillon, Sauvignon Blanc, and Muscadelle du Bordelaise grapes, from J. A. Hudson, of Elmira, Solano County. The wine is now in good condition, and promises well.

I will state that the only gold medal awarded at the Paris Exposition for California brandy was awarded to this Commission for the samples sent from our cellar.

The shortage on this year's wine crop has developed a better feeling in the industry, and I hope that the new work begun by this Commission will show even better results next year.

Respectfully submitted.

CLARENCE J. WETMORE,
Manager.

THIRD REPORT.

Read at the annual meeting, held June 9, 1890.

SAN FRANCISCO, June 9, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: As Manager of the Hall and Experimental Cellar, I respectfully submit the following annual report, showing the work that has been done during the past year: The plan of work outlined in my last yearly report has been carried out during the past year, and I am glad to announce that the work has been attended with more success than was at first anticipated. Since making my last annual report nine more exhibitors have placed their wines in the hall, and only one has withdrawn. Of the new exhibitors two are from Alameda County, four from Santa Clara County, and three from Fresno County. Altogether there are now forty-three exhibitors, and forty-two of them have their wines for use in the café.

Last December the Placer County people asked permission to make a display in this hall of the products of their county. The request was granted, and all the space possible was given them. The exhibit lasted

for two weeks, and during that time from thirty to forty thousand people visited the hall.

Permission was also granted the Fruit Union to hold their annual meeting in the hall. Accommodations have also been provided for the monthly meetings of the Grape Growers and Wine Makers' Association. Several applications have been received to rent the hall for other purposes, such as auction sales, lectures, etc., but the requests were not granted. If the Commissioners think it advisable to rent the hall for such purposes, the rent can be reduced considerably in that way.

The business of the café has kept up reasonably well, considering the support given to it by both producers and merchants. A number of the exhibitors have not entered the café during the year, and the work of keeping it up has been left entirely to a few exhibitors and the officers of the Commission. The result of their work is given below. United action on the part of the exhibitors would do much to increase the popularity of the place, and by so doing every exhibitor who has his wines for sale would be benefited. The following tables show the business done in the café during the year:

Month.	Number Bottles Sold.	Amount Received.
June	317	$125 10
July	328	136 40
August	321	131 15
September	298	126 35
October	614	247 95
November	617	258 30
December	715	316 50
January	437	182 05
February	491	197 25
March	350	177 25
April	515	205 70
May	458	128 75
	5,471	$2,232 75

The disbursements were as follows:

Paid to exhibitors	$1,509 05
Twenty per cent premium to café	349 25
Reserve Fund	246 35
Balance due exhibitors	128 10
	$2,232 75

The corkage on the wines sold in the café, allowed the proprietor, amounted to $427 05, and this added to the 20 per cent on cased prices, or $349 25, gives $776 30 as the total amount the café received for the sale of wines.

The amount credited to the Reserve Fund from sales in the café since the opening amounts to $344 50. From the sale of bottles, cases, and tules, $68 50 has been realized and the amount placed in the Reserve Fund, making a total of $413. The disbursements out of this fund were as follows:

Printing wine lists	$84 75
Ice	4 90
Advertising	125 00
Special article in wine edition of "Examiner"	150 00
Checkbook	75
	$365 40

Carrying a balance of $47 60.

Through instructions from the Executive Committee I had our wine list printed in the special wine edition of the "Examiner," agreeing to pay for the same $150 out of the Reserve Fund, and to collect $5 from as many of the exhibitors as were willing to pay, and to turn the amount collected over to the "Examiner," the whole amount to be paid for the article not to exceed $300. So far I have collected $70 from the exhibitors. Three thousand copies of the paper were given us, and they have been mailed to all our correspondents. Already I have received a number of letters from parties wanting samples of wines, and asking how they can be sent to them.

The number of empty bottles on hand in the store-room is as follows:

Claret, quarts	36
Claret, pints	2,100
Hock, pints	365
Hock, quarts	66
Champagne, pints	149
Champagne, quarts	66
Brandy (white)	50
Brandy (black)	43
Sauterne, quarts	43
Sauterne, pints	33
Total	2,952

The amount received for these bottles, when sold, will be placed in the Reserve Fund.

During the year I have tested seventy-one different samples of wines for alcohol, and four samples for acid. The alcoholic test was made by means of the ebullioscope, and the acid tests by Twitchel's acidimeter. The above tests were made free of charge.

The wines in the Experimental Cellar have been cared for, but have not been bottled. Some of them need bottling, and I would suggest that the committee in charge of the Experimental Cellar examine the wine, and instruct me which samples to bottle. I would also suggest that a small room be fitted up in the cellar to be used as a sherry-room. The expense of fitting up such a room would be small, and the room can be heated by means of a gas stove. There are a number of wines in the cellar that I am endeavoring to make sherry of, but the development is slow, owing to the coolness of the cellar.

Several improvements are needed in the hall, but lack of funds has prevented the making of them. I would suggest the fitting up of the entrance in a more attractive way, and that more lights be put in the roof.

Respectfully,

CLARENCE J. WETMORE,

Manager.

REPORT OF ISAAC DeTURK,

Commissioner for the Sonoma District.

SANTA ROSA, CAL., September 18, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I beg leave to submit the following viticultural report for the Sonoma District, as required by the blanks furnished by the State Board (for the new directory now being compiled), together with other matters coming under my personal observation, that may be of interest to the Board.

The work has been laborious, and has taken considerable time, as every section has been visited, and nearly every vineyard has also been visited.

Fully three fourths of the vineyards of the district are located on the hills and mountain sides, which made the labor of gathering statistics more arduous and difficult.

I have found in the district nine hundred and twenty-five vine growers who cultivate five acres and upwards. Of these, eight hundred and forty-two are located in Sonoma County.

The following statement shows the number of owners, acres in vines, and product of each county:

SONOMA COUNTY.

Vine growers having five or more acres	842
Total acreage in vines	22,683
Total acreage in bearing vines	21,053
Total amount of grapes, in tons, for year 1889	41,013

LAKE COUNTY.

Number of vine growers, five acres or more	48
Acreage in vines	1,061
Acreage in bearing vines	1,008
Tons of grapes, product of 1889	2,148

MENDOCINO COUNTY.

Number of vine growers, five acres or more	20
Acreage in vines	204
Acreage in bearing vines	183
Tons of grapes, product of 1889	343

MARIN COUNTY.

Number of vine growers, five acres and upwards	15
Acreage in vines	502
Acreage in bearing vines	441
Tons of grapes, product of 1889	637

RECAPITULATION.

Total number of vine growers in the district	925
Total number of acres in vines in the district	24,450
Total number of acres in bearing vines in the district	22,685
Total number of tons, product of 1889	44,141

To the total acreage in vines for the district might be added at least five hundred acres of small vineyards of less than five acres, planted merely for family use. This will increase the total acreage of the district to at least twenty-five thousand acres in round numbers.

The total number of acres planted to table grapes exclusively is four hundred and eighty-five, the varieties being Muscat and Tokay.

From personal observation and from conversation with the vineyardists and wine men of the district, I have obtained the following information on subjects pertaining to the grape and wine interests:

The great body of vines in the district are planted on rolling hills, or on the mountain sides, exposure to the sun being observed in the location of the vineyard. The soil upon which vines appear to produce the best quality of grapes—especially for wine purposes—is either a red gravel, or clay, or white volcanic ash, in which there are more or less properties of iron. This character of soil is confined almost exclusively to the hill and mountain lands, and hence the greater number of vineyards are located on higher lands.

The valley lands produce a greater growth of vine, and a larger yield of berry, but at the expense of quality.

The product of the year 1889 has been somewhat difficult to arrive at, as many vineyardists lost a great part of their crop by the early rains; yet by a careful approximation the result of the report has been arrived at.

The vineyards all over the district are looking exceedingly well, and I find no failure, except in the Sonoma Valley. Here the ravages of the phylloxera have decimated many vineyards, the pest slowly but surely creeping along the whole extent of the valley. So far no remedy against this insidious enemy of the vine has been discovered. The only recourse the vineyardist has, is to replant with resistant vines. This is being generally done, although many vineyardists have become discouraged, dug up their vines, and planted their ground to other crops.

But little additional acreage has been set to vines in the past two years. Those planted will about equal the number torn out and killed by phylloxera.

In a few localities the effect of the low prices obtained for grapes last year is apparent, the vineyards having been neglected and not properly cultivated. The result is that a poor crop will be gathered on these lands.

The great body of vine lands and vineyards are to be found in Sonoma County. The counties of Marin and Mendocino, with a long fog belt extending inland fifteen or twenty miles, have but little land favorably situated for vine growing. Late frosts prevent the realization of a crop in the valleys of northern Lake and Mendocino Counties.

The southern portion of Lake County is admirably situated for vine growing, the climate and soil being all that could be required; yet the great distance to market and absence of transportation facilities have made vine growing unprofitable, so far, in this section.

Many vineyardists contemplate setting out more of their lands, or resetting dead vines with the table varieties—Muscats, Tokays, etc.—as they appear to be longer lived, and resist the ravages of the phylloxera better than other vines. At the same time they command a better price in the markets.

But little loss has been sustained from mildew or sunburn the present

season. What loss has been incurred from these causes is due to carelessness and injudicious pruning.

The grape crop of 1890 will average about the same as that of 1889.

There are many thousand acres of good vineyard lands, as yet unimproved, not only in Sonoma, but in Lake and Mendocino Counties. In the last two counties named, the hill lands—where thermal qualifications are favorable—appear to be especially adapted to growing a good quality of the grape, the soil being almost wholly the red gravelly clay, or volcanic ash, considered best for the grape. At the same time, these lands are as yet comparatively cheap. The low prices obtained for grapes the past few years, as well as the stagnation ruling in the wine market, added to absence of transportation facilities, have kept these valuable vine lands from being improved. With a better market, and more favorable conditions, these sections will become heavy vine-growing districts.

By far the largest variety of grape grown in the district is the Zinfandel (this being peculiarly the wine grape). The Golden Chasselas, Burger, and Black Malvoisie come next, while some vineyardists affect a mixture of all the foreign varieties.

At present, most of the wine cellars of the district are empty, or nearly so, the vintage having been shipped to the market or stored.

A large proportion of the present season's grape crop in the northern part of Sonoma and the southern part of Lake County has been contracted to parties for drying purposes.

It has been impossible to obtain an estimate of the wine manufactured in the district during the past year, as the cellarmen have been inclined to be reticent on that point for fear the information might have an unfavorable effect on the wine market.

A considerable quantity of the wine product has been, and is being, manufactured into brandy.

In conclusion, I will say that I have used every endeavor to obtain a complete and exact report as required by the State Board, and nothing has been omitted that careful attention could accomplish.

All of which is respectfully submitted.

ISAAC DeTURK,
Commissioner for the Sonoma District.

METEOROLOGICAL RECORD

Of Observations Taken by Station Agent George R. Stone of the Southern Pacific Company, at Santa Rosa Station, from August 1, 1888, to August 31, 1890, a Period of Two Years.

Months.	Temperature.			Rain-fall—Inches.	Weather.		
	Max.	Min.	Mean.		Number of Days Clear.	Number of Days Cloudy.	Number of Days Partly Cloudy.
1888—August	98	50	71	--------	20	1	10
September	95	53	64	1.62	20	3	7
October	85	35	63	--------	18	1	12
November	81	32	53	3.48	15	11	4
December	69	40	51	5.37	5	23	3
1889—January	69	28	47	1.77	23	7	1
February	72	25	44	.35	22	5	1
March	79	35	53	7.92	15	14	2
April	81	43	58	1.09	14	12	4
May	83	42	59	2.93	15	13	3
June	88	52	65	.25	24	3	3
July	90	46	67	--------	25	1	5
August	86	45	66	--------	24	--------	7
September	90	42	65	--------	24	3	3
October	82	44	62	8.78	14	17	--------
November	76	34	55	4.39	17	13	--------
December	66	32	49	9.47	9	22	--------
1890—January	60	27	42	12.84	6	25	--------
February	66	28	43	4.74	10	17	2
March	68	34	53	6.13	11	19	1
April	78	40	58	1.82	14	11	5
May	95	43	62	1.40	18	8	5
June	86	42	64	--------	23	2	5
July	100	51	67	--------	25	--------	6
August	88	48	65	--------	20	1	10
Totals	--------	--------	--------	82.33	431	232	99
Average	84	35	57	41.16	18	9	4

REPORT OF E. C. PRIBER,

Viticultural Commissioner for the Napa District.

NAPA, August 20, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: It is not very gratifying for the undersigned Commissioner for the Napa District to make his annual report at a time when the conditions of the wine industry are so deplorable as they are at present; but it is with special pride that we can claim for this district, that with all the hard times, the low prices for wines, and the terrible destruction by phylloxera, it shows wonderful improvements, and has gained, during the past few years, a high reputation for the qualities of both its wines and brandies.

The difficulty found in disposing of the young wines at a remunerative figure has forced many growers to hold their products, to buy the best oak cooperage, and to build new cellars. This, as it might be called, "forced retention of aged wines," has enabled them to seek and to find a profitable market with the consumers here and outside of the State.

NAPA COUNTY

Has improved immensely in its cellar facilities. Of nearly five hundred growers, more than one hundred make their own wines. About fifty of them have stone cellars, partly underground or tunnels. The total cooperage in the valley reaches ten million gallons.

While it is true that very little wine of Napa Valley is offered on the San Francisco wholesale market at present, large quantities of the last three vintages are still held by the growers, who can give their product proper care and time to develop those qualities which command a remunerative figure.

These terribly hard times have taught this valuable lesson: that not all wines made are excellent, and not all can be judiciously aged; and thus learning to discriminate, the grower prefers to send all doubtful wine to the distillery to putting it on the market, or to aging it, and by doing so injuring both his reputation and that of his district.

We have thirty-five registered distilleries in Napa County, which have reported to the Internal Revenue Department two hundred and forty-two thousand one hundred and eighty gallons of brandy, from October 1, 1889, to August first, of this year. Quantities of this brandy have been shipped to Europe, where our Napa brandies have gained an excellent reputation.

The ravages of the phylloxera have been more noticeable than ever before. Only about 10 per cent of the fifteen thousand acres are planted in resistant vines. The experience with resistant vines in France, where the production is now rapidly increasing, in consequence of the replanting of those vineyards which were destroyed by the phylloxera, should teach us a lesson. It cannot be impressed too strongly upon our growers

that the replacing of their diseased vines by *Riparias* is the only true salvation for their vineyards, and it might be advisable for our Board to consider if our funds, and the law which appropriates them, would not permit the furnishing of *Riparia* roots to the wine growers. We would also recommend to use all efforts in inducing the growers to pull out and burn up all diseased vines, the present condition of affected vineyards in this State containing these diseased vines making them hotbeds for the propagation of this plague. Experience has shown that where diseased vines have been pulled out and destroyed, the progress of the phylloxera has been comparatively slow.

This year's crop in Napa County will be smaller than those of 1888 or 1889. The shortage is caused mostly by the ravages of the phylloxera, and somewhat by coulure and sunburn. The Zinfandel, which is by far the most predominating grape, did not set as fully as usual, and will yield a light crop. The white grapes are looking very healthy, and give promise of a beautiful crop.

SOLANO COUNTY

Is one of the few counties where table, raisin, and wine grapes (suitable either for drying purposes or the manufacture of sweet or dry wines) are cultivated to perfection. This county has about three thousand acres in bearing, of which about one thousand acres are used for table grapes. The product of five hundred acres is made into raisins, and one thousand five hundred acres are in wine grapes.

In the northern part, around Dixon, we have about five hundred acres in grapes, nearly one half of which are cultivated for raisins alone. The balance of the grapes will be dried this year—in fact, most of them are already contracted for. In former years, a couple of hundred tons of grapes were sent from this neighborhood to the wineries at Cordelia, Napa City, and San Francisco. No wines will be made in this locality the present year.

In the Vacaville section, including Pleasant Valley, most of the grapes are sold for table use. The few vineyardists having wine grapes will dry the present crop. In Pleasant Valley a great many vineyards are partially destroyed by phylloxera. Vineyards near Vacaville look healthy, are well taken care of, and do not show much signs of phylloxera. They prove to be an excellent investment this year. Only a few small wineries exist here, the production of which does not figure largely in the great market.

The vineyards around Cordelia, including Suisun, Fairfield, Benicia, and Green Valley, are planted solely to wine grapes. The climatic conditions do not favor raisin culture and scarcely permit the drying of their product. We have many wineries in this vicinity, which, as the phylloxera has made considerable progress, and has destroyed already hundreds of acres here, are fully able to handle the present crop, which looks very promising. Some grapes near Fairfield make very good sweet wines, but the larger part of the product of the wineries is light, dry wines from grapes grown on the hills surrounding Green Valley and the slopes near Benicia. Solano County may now have two hundred thousand gallons of wine in its different wineries and cellars, and will produce not more than five hundred thousand gallons this year.

CONTRA COSTA COUNTY,

Which produces largely table grapes, lost a considerable portion of last year's crop by early rains. This year's crop is very promising. The wine production in the county may reach four hundred thousand gallons during the coming vintage.

Respectfully submitted.

E. C. PRIBER,
Viticultural Commissioner for the Napa District.

REPORT OF CHARLES BUNDSCHU,

Commissioner for the San Francisco District.

San Francisco, October 25, 1890.

To the Board of State Viticultural Commissioners:

Gentlemen: I am gratified in reporting to you that the state of viticultural matters pertaining to the Third, or San Francisco District, may be considered in a fair condition of prosperity.

The depressing and unfavorable circumstances that impaired the healthy advancement of the industry for some time past, appear to be supplanted by a feeling of renewed confidence and hopeful expectation.

I find that in all the different sections comprising this extensive district the stock of old wines held in first hands is limited, and that the new vintage could be taken care of without difficulty. Although special inducements have been offered this year for the preparation of dried grapes on a larger scale, sufficient wine grapes have been reserved for wine-making purposes to make our vintage a very abundant one, and sufficiently large to replenish the stock for the regular trade requirements.

SANTA CLARA COUNTY.

Santa Clara County has developed into one of the great centers for the production of red wine varieties, and the general characteristics of the wines—good color and body—make them a desirable product for the great bulk of our export clarets. The Charbono variety, extensively cultivated in the past, has been largely eliminated and replaced by grafts of the Burgundy and Bordeaux types, greatly increasing, thereby, the value of the product. Some of the finest claret types are grown in this wonderful section, especially in the mountain regions, and after undergoing proper treatment and cellar handling, their merits must and will command general approbation and appreciation. They have compelled recognition heretofore, and will continue to grow in public estimation hereafter.

SAN MATEO COUNTY.

San Mateo County is also making strenuous efforts to increase its acreage of vineyards. Its vineyardists are planting out the choicest varieties in the mountain regions, evidently well adapted for the cultivation of the vine. These new vineyards will soon come into full bearing, and will undoubtedly produce satisfactory results.

SANTA CRUZ COUNTY.

The Santa Cruz Mountains District has had good opportunity to show its superiority in many respects. The wines are not very heavy in alcohol, but develop a most delicate flavor and highly distinctive aroma,

which may be attributable to the proximity of the ocean. The yield of the vines is generally light, and cultivation is more difficult and expensive than that of the valley lands, but the result shows immense possibilities, limited only by the degree of skill and knowledge of the vineyardist to assist Nature's efforts and to overcome difficulties of fermentation and development.

ALAMEDA COUNTY.

Alameda County, and especially Livermore Valley, appears to have made the most formidable progress in the general rivalry for the production of the higher types of fine table wines. The distinction of the highest awards of merit that were accorded to the products of this now famous district by the Paris Exposition of 1889, must be considered evidence of superiority of climatic conditions and adaptability of soils, especially to Sauterne and Bordeaux varieties, as well as the wine makers' skill and careful methods of making, treating, and ripening their products.

So far as general statements may be relied upon, the Third District is free from the attacks of the phylloxera, and although no serious apprehensions are felt on the part of the wine growers, abundant provision is made for the introduction and propagation of resistant vines. In fact, some newer vineyards of the district have been entirely planted with resistant stocks and grafted with the most approved varieties.

CONDITIONS OF TRADE.

The conditions of trade have not been very favorable for our California growers for some time past. Although the shipments from this port and interior points show a healthy increase in volume, prices have declined to a remarkably low and unprofitable standard. One of the principal reasons for this unfavorable condition of affairs in the past is undoubtedly an over production of inferior wines, which, under the ordinary pressure of commercial competition, have found their way into the channels of trade, and under competitive prices have degraded the prestige, and dragged down the prices of our superior products. The general opinion that all our wines should have a certain age before they could advantageously be placed on the market has induced many to hold their products for future prospects. It should be remembered by all parties interested:

First—That only a limited portion of our wines can be safely placed aside for storing and aging, and that quality alone can form the criterion for judicious selection.

Second—That the conditions essential for preservation, for the improvement, and for the maturing of wines into a really fine product, must be thoroughly understood.

Third—That when the fundamental conditions of original soundness, excellence of quality, and the means of preservation, coupled with the knowledge of methods, are wanting, all attempts at aging wines will most assuredly result in failure, sacrifice, and disappointment.

When only eight or ten years ago it was firmly asserted by representative authority, and published all over the State, that California could never produce too much wine, and that the then prospective vintage (variously estimated at forty to fifty million gallons) would be readily disposed of; when it was stated that the happy owner of an hundred

acres of bearing vineyard would be the enviable possessor of an estate equal to an independent fortune—then nobody anticipated that even the largely reduced yearly quantity of about eighteen million gallons could bring about a disastrous flooding of the wine market. That the prophetic glorification of the future of our industry was not to be realized up to the present time, is due in great measure to the fact that our American population are very slow in adopting the habit of drinking wine in moderation—a habit almost as old as the world, and to-day indulged in by the most enlightened and cultured nations of Europe.

The planting and growing of a vineyard is only the beginning of the problem of "making wine," the solution whereof is its profitable marketing. The production of ordinary wines may be comparatively an easy task, but the selection, nursing, and aging of wines of superior quality is an accomplishment acquired only after untiring application and experiments, coupled with natural ability and skill.

I am most happy to note quite an advance among the growers of this district in all the qualifications of successful wine men, and in proof of my assertion I point to the improvement, especially in the quality of wines made these last two years. I doubt not but that the future will show still better results and bear witness to the correctness of my judgment.

I look upon our past and present struggles as an unavoidable reaction from over-sanguine expectations, which must naturally adjust itself, and then the wine industry will once more be established on a basis remunerative to all.

Respectfully submitted.

CHARLES BUNDSCHU,
Commissioner for the San Francisco District.

REPORT OF GEORGE G. BLANCHARD,

Viticultural Commissioner for the El Dorado District.

PLACERVILLE, CAL., August 18, 1890.

To the Board of State Viticultural Commissioners:

I am pleased that in making this report of the general condition of viticulture in the El Dorado District, I am able to give the Board a more reliable account of the progress and extent of vine growing than I have been able to do in any former report.

For the purpose of better acquainting myself with the absolute condition of this branch of industry, I have quite recently made extensive visits into the counties of Yuba, Sutter, Nevada, Placer, Amador, Calaveras, and Tuolumne; and have received reliable information in relation to the subject of viniculture in the counties of Mono, Inyo, and Mariposa.

I am informed by the several Assessors of the counties of Alpine, Plumas, Sierra, and Mono, that there are no grapes of any kind raised in those counties, except it may be a few experimental vines, planted more for experiment and curiosity than from any idea of profit.

Grape raising, either for wine, table, or raisins, in my district is principally confined to the counties of Placer, Amador, El Dorado, and Calaveras. However, I have found some very fine specimens of raisins and fine qualities of wines produced in the counties of Nevada, Yuba, and Tuolumne.

The raisins of Placer and El Dorado Counties have long been known to the raisin market as superior in quality, those of Placer County having taken the first premium at the Citrus Fair held in Sacramento in 1887.

El Dorado County, having been the site of the discovery of gold in California, necessarily had attracted to it the earlier immigrations to California; and to the gold mining was added, at an early day in its history, that of viticultural pursuits. The early vineyards were planted to what is known as the Mission grape. Probably some of the oldest vineyards in the State, outside of the Missions, are to be found in El Dorado County, planted when no other grape was known in the State except the Mission variety. As the foreign vines became introduced into the State, they necessarilly found their way into this county, so that to-day we have vineyards of the finest foreign varieties. The soil and climate, to an altitude of two thousand eight hundred feet above the sea level, is found to be conducive to their growth to perfection. This adaptation of soil and climate is not confined to the growth to perfection of any particular kind of grape, but extends to the whole family and species.

Except in the county of Placer, and there only to a limited extent, have vine pests of any kind affected the vineyards.

The vines, from an altitude of six hundred feet to that of two thousand eight hundred feet above the sea level, have a uniformity of growth,

healthfulness, and producing qualities. Those of the higher altitudes contain much more of saccharine matter than those of the lower altitudes.

Those grapes cultivated for table use, such as the Tokay, Emperor, Rose of Peru, and Muscat of Alexandria, obtain, in the higher altitudes, a greater degree of perfection in color, richness, and consistency than those grown in lower altitudes. The Flaming Tokay, at an altitude of two thousand feet, arrives at that peculiar color from which originated its sobriquet of "Flaming," and has that degree of brightness not to be found in those grown in the lower altitudes. The Muscat of Alexandria is relieved of that green appearance which it has in the valley counties, and possesses in the foothills a rich golden appearance; and it also has a more pronounced richness of the Muscat flavor.

In the counties of Yuba, Nevada, Placer, El Dorado, Amador, and Tuolumne, there is more or less wine made of a very superior quality. In Yuba, there is a winery whose annual product runs into the hundreds of thousands of gallons, owned and operated by Mr. G. Sieber. At Nevada City, there is also a winery, owned and operated by the Nevada County Wine Company, producing some ten thousand or fifteen thousand gallons of wine annually. In El Dorado County, there are several wineries, all producing a first class quality of white wine, and some of their red wines command the highest price in the market.

The wines of Mr. George Sieber, both red and white, dry and sweet, will compare favorably with those of any other section of the State, and are the product, I was informed, of the grapes raised in the foothills back of Marysville. All the grapes converted into wine at the Nevada Winery are raised in the higher altitudes of the grape-producing regions of Nevada and Placer Counties, none of the grapes being raised at a less altitude than from two to three thousand feet.

The grape-producing regions of my district will cover, from Yuba to Inyo Counties, an area of from twenty to thirty miles in width, by from two hundred and fifty to three hundred miles in length; and of all this vast region, there is not a thousand acres but what is susceptible of producing the finest qualities of grapes of any variety, either for wine, raisin, or table use.

Profit being the great desideratum of all industries, and especially those that require so much labor and expense as that of grape culture, wine, and raisin making, as to this vast area, the great distance to market, and almost total want of facilities for transportation, have caused this industry to be neglected; for no matter how complete an adaptability there may be, both in soil and climatic condition in this region, unless the industry can be made profitable, it will find but very few who will embark in it.

It is strange to observe, and yet true, that very little sulphur or other curative articles are used in any of the vineyards in these localities, there being no apparent need of their use, especially in the higher altitudes of the grape-growing regions.

On account of this distance from market and want of transportation facilities, very few new vineyards have been planted in the last year or two. In Placer County, there has been a marked increase of acreage in the planting of vines in the last year, which, on account of the facilities for transportation to market, have been mostly table and raisin varieties.

Since the establishment of this Commission it is observable in all of the vine-growing localities of my district that there has been a constant increase in the cultivation of those superior varieties of foreign vines, both for wine and table use; and also through the advice and information in wine making, given to our wine makers and viticulturists through our Chief Executive Viticultural and Health Officer, there has been a most remarkable advancement in the art of wine making and grape culture generally.

At no distant date, when railroads shall have been extended so as to reach these grape-producing lands to such an extent as to afford facilities for cheap transportation, this whole region to which I have alluded will be one vast vineyard, giving employment to thousands of laborers and adding vastly to the wealth of California.

Inasmuch as the Board of State Viticultural Commissioners are engaged in the compilation of a new directory of the grape growers, wine and raisin makers, I shall omit in this report any extended history of the development this industry has attained in my district, and ask those interested in and desirous of the information to consult this new directory for the same.

GEORGE G. BLANCHARD,
Commissioner for the El Dorado Viticultural District.

REPORT OF ETHELBERT DOWLEN,

Special Agent to Investigate the Anaheim Vine Disease.

Being one of a series of forty-three reports now on file at the office of the State Viticultural Commissioners, and read at the annual meeting, held June 9, 1890.

To the Board of State Viticultural Commissioners:

In September, 1888, the Board of State Viticultural Commissioners decided upon making an investigation into the causes of the destruction of the vineyards of the Los Angeles District. The disease which was the cause of the trouble had then been at work for at least four years, and is still working, though with lessened virulence, and it has proved to be, probably, the most destructive disease that has ever attacked the vines of this country, quite equaling in its power for evil either black rot or phylloxera.

At the beginning of the investigation, which was placed in the special charge of Hon. J. DeBarth Shorb, a series of questions as to date of attack, soil, varieties grown, and their resisting power, practice in cultivation, etc., were sent out to the principal vine growers of the affected district. Five hundred circulars were sent out. One hundred and one replies were received. Nine replies were from parties who had given up viticulture; there were, therefore, ninety-two replies from persons actually engaged in vine growing. The information given in these replies has been tabulated and sent in. (Reports 15, 27, 28.) A special set of circulars was also sent to those vineyardists who were in the habit of regularly sulphuring their vines; the information on this point is tabulated in report 15.

The answers to circulars gave particulars as to thirty-six localities and forty-six varieties of vines. So far as the information given in these replies goes, it seems that the disease (variously known as "Los Angeles disease," "Los Angeles rot," "new disease," and "mysterious disease," but named by the Commission the "Anaheim disease") which has been the cause of all the trouble had been working in the vines for at least four years previous to 1888.

The earliest date of attack reported is 1884, when it was first noticed in North Pomona and Anaheim, the former locality being at least twenty miles northeast of Anaheim, a range of hills running between the two places.

The disease then spread from Anaheim, apparently remaining almost, if not quite, stationary at North Pomona.

The dates of first attack at various points are given below:

Anaheim and North Pomona in 1884.
Santa Ana in 1885.
Orange, Tustin, Fullerton, McPherson, Los Angeles, San Gabriel, Alhambra, and Burbank in 1886.
Lamanda Park, Florence, Tropico, and Vernon in 1887.
Verdugo and Maynard in 1888.
Riverside, El Cajon, and Sweetwater Valley were not reported until 1889.

The above dates give the period when attention was first drawn to the altered condition of the vines in the various localities; in all probability the disease had been present for some time previously. One thing is evident, the vines were first attacked seriously in and around Anaheim and Santa Ana, sweeping all through the Santa Ana Valley, spreading thence northwesterly to Los Angeles, thence eastward along the San Gabriel Valley to Azusa, through Lamanda Park and Sierra Madre, where, however, it has not done much damage. Northward from Los Angeles the disease went along the San Fernando Valley, through Tropico and Burbank, even jumping the Soledad Mountain, and reaching Maynard, in Antelope Valley, at over two thousand feet above sea level.

In 1889 the disease made a jump over into San Diego County, appearing first in El Cajon Valley, and afterwards in the Sweetwater Valley. The districts around Los Angeles seem to have suffered about alike, but not to the same extent as the Santa Ana Valley.

The same disease was noticed by Prof. F. L. Scribner and Prof. Pierre Viala, in Napa Valley, in 1887, where it was again seen in 1889; but in this district it has never done any harm.

With respect to the resisting power of the vines, the Mission and Muscat varieties were first affected, and have suffered most; the Burger, Mataro, and Trousseau come next; the Carignan and Grenache have suffered slightly; the Blaue Elba scarcely at all; the Lenoir and Gamay Teinturier have escaped altogether. The wild vines have also been attacked.

It does not seem that irrigation or non-irrigation, soil, time and manner of pruning, or climatic conditions, can be claimed as being the prime cause of the disease, though each of these may have some bearing upon the case. Altered climatic conditions were at one time somewhat strongly urged as the cause of all the trouble, the wet season of 1884 having been followed by the first noticeable attack being advanced as proof. If there is anything in this view, the exceptional rainfall of the past winter should be followed by increased severity of disease; instead of this, the reverse is the case, as there is at the present time (June) much less disease amongst the vines than at the corresponding period of last year.

Respecting the manner in which the disease manifests itself, the following are the chief points: The earliest symptoms of attack are shown by a few of the leaves exhibiting peculiar yellow spots and patches. These leaves may be found on one or two canes only, or they may be scattered over the entire vine. These spots, at first small, often spread until almost the whole of the leaf blade is involved; sometimes only one side of the leaf is affected. The spots may remain as irregular patches, or may occupy all the space between the principal veins of the leaf, in which case the cellular tissue is discolored, whilst the fibro-vascular ribs remain green, forming a very definite pattern. In black varieties the yellow patches turn red, and eventually become brown and dead. In white varieties the yellow spots retain their color until they become brown and dead. The edges of the leaves become dead, and curl up over the upper surface of the lamina of the leaf; eventually the leaf dies, and often the lamina drops off, leaving the petiole attached to the cane. In the second year, soon after the vines have started, many of the young leaves, when about an inch in diameter, have their edges blackened and

curled up as though scorched or badly frosted; the leaves which are afterwards produced will show the same markings as those first described. At the same time as these changes take place in the leaves, the fruit may be attacked; some of the berries, or perhaps all, in a bunch will shrivel, and, in the end, dry up, in which case they will remain hanging on the vine; or the development may be arrested, in which case the fruit, if it ripen, will be hard and sour. The fruit may be attacked at any time from the opening of the blossom, or occasionally a little before then, until the first coloring of the berries.

In the second year of disease, the canes are, many of them, dwarfed and much crowded on the main stock; if they are of larger growth, they are often flattened and have their internodes shortened.

In the third year, the growth is very much reduced, the canes are often only a few inches in length, and the vine usually dies before the end of summer, though sometimes it will live on for another year. It not unfrequently happens that in each year diseased vines will put out suckers which, at first sight, appear very strong and healthy, but these, too, in the end, die in the same way as the rest of the vine.

Usually, the vines will live on for three years from the first attack, though sometimes they will struggle on for five years, or, as in the case of some Mataro vines, they will die in a short time from being first attacked. The Mataro vines referred to were attacked suddenly in August, 1888, the leaves dropped, and the fruit dried upon the vines, and before winter many of the vines were dead. Those that were left, came out somewhat weakly in 1889, and again went under shortly after the hot weather set in, and practically the whole plot was dead before the winter of 1889.

The canes of diseased vines show the following features, in addition to those noted above: Many canes do not ripen at all, even though they may have made a fair growth; others are ripened only on one side; others have patches of unripened wood and bark; these unripened patches and stripes often turn greenish brown and black on the outside. Internally, the characters are as follows:

In the earlier stages of disease, the wood, though still green, is drier and lighter colored than in healthy canes. Soon yellowish and brown spots and streaks appear in the woody bundles. Eventually the whole of the wood becomes dark brown and moist, the pith also becomes darkened, and the inner bark becomes blackened, so as to show in a transverse section, as a black ring around the fibro-vascular bundles. The medullary rays sometimes show darker than the rest of the woody tissues. The bark is also easily detached from the wood. Similar characters are also found in the spurs and stock, and later on, in the roots as well.

The sap ceases to flow as a watery fluid, but oozes out from the cut surfaces of canes or stem in transparent, colorless, gummy masses.

The disease always travels downwards. The tips of canes die first, and it is quite easy to find canes, which apparently are quite green and healthy at their junction with the stem, but which are quite dead for at least half the distance from the tip. On cutting such canes longitudinally, the transition from fresh green wood to that which is dead and brown is plainly seen.

The same course is taken by the disease in cuttings. Amongst the cuttings taken at the time of pruning in 1888–89, many were found to have developed disease after being put in the nursery, and it was found

to be always the case that the disease started at the upper end. Some cuttings were purposely planted in an inverted position, still the result was the same—the disease always started at the end which was naturally the farthest from the main stem, whether that end was placed in the air or in the soil. Cuttings taken from presumably healthy vines, and brought from a distance, have not always proved to be exempt from disease, but have shown the first signs in the first year of planting.

There is also often a rapid increase of disease in a vine immediately after pruning. This was noticed in the pruning season of 1888-89, and again during the last pruning season. In one instance spurs were observed to die back five inches within seven days after pruning.

Under the microscope, the tissue of diseased canes always show the same characters, which are as follows:

In those canes which remain unripened, and in those which appear to be drier than is normal, it will be found that starch is either altogether absent or is present only in scattered grains, few in number and small in size, which often appear to be eroded. These scattered grains are often discolored, and sometimes do not readily turn blue on the application of iodine. In those canes which have one side ripe and the other side unripe, the tissues of the ripened portion are almost always well supplied with starch—some starch will always be found—whilst in the unripened portions the tissues will be altogether devoid of starch. In the discolored areas of the woody bundles, the components of the tissues are seen either to have their walls simply stained brown or else the cell cavity is partially or wholly filled up with a dark brown deposit; this is especially the case with the blackened inner bark above mentioned. The larger ducts and vessels are often seen to be more or less filled up with thylles, which are developed sometimes to a great extent. Threads of mycelium are also found in more or less abundance running through the various tissues. Bacteria are found more or less plentifully, and various forms of fungi are abundant upon the canes of diseased vines.

No insects have been met with which could have anything to do with causing the disease—in fact, the vines of this district are seldom affected by insects of any kind, a very rare invasion of army worms, or an occasional attack of cut worms, being all that has to be contended with, there being no phylloxera in this district.

The above are the chief features presented by vines affected with the Anaheim disease. What this disease is, cannot positively be stated at present. It may be that more than one disease is concerned in the death of the vines. None of the ordinary diseases of vines, such as anthracnose, black rot, downy or powdery mildews, the various root fungi, or phylloxera, are concerned in the case.

At present the Anaheim disease stands side by side with certain European vine diseases, which have not yet been worked out, though they have been known and studied for a long time.

The malady to which the Anaheim disease bears the greatest likeness is mal-nero, which has been known in Sicily and Italy for many years past, and where it has been studied for the last twenty years, having been first recognized, according to M. Cugini, in Sicily, in 1863.

The general characters of mal-nero are as follows: The internodes of the canes are shortened and flattened instead of remaining cylindrical.

According to M. Gregori, the leaves are spotted with yellow and red, and present on these spots small drops of resinous substance. The fruit bunches dry up. A transverse section of the stem shows the wood to be spotted brown or black. The bark is only slightly adherent and is brown. The entire wood becomes altered, and the roots still appear healthy when the stem and branches are much changed.

Under the microscope it is seen that, in the altered cells, the starch, which is normally present, has disappeared, or looks as if gnawed, and is brown. It changes color with difficulty on application of iodine. The members of the cellular tissues are brown; in the interior of the vessels there is a great increase in the number of thylles, and there is an abundant deposit of thick brown matter. Bacteria are also abundant.

Vigorous shoots are often put forth from the stem near the ground, or even from the roots. The disease always travels down from the main stem to the roots, and the vine finally dies in from three to five years.

From the above it will be seen that there are many points of resemblance between mal-nero and the Anaheim disease. Still there are some points of difference; *e. g.*, the case of the Mataro vines which were suddenly struck down; other instances of a sudden attack after a spell of hot weather have also been reported. To a certain extent these cases of sudden attack resemble folletage rather than mal-nero, as folletage most frequently happens after heavy rains, and during great heats. Under an attack of folletage, vines will suddenly lose their leaves, even the canes will sometimes dry up, and the vines die soon after. But whilst with folletage vines are only killed here and there, and the trouble does not spread, in the case of the Mataro vines above referred to almost entire blocks were killed, and the trouble continued into the following year. Moreover, the attack did not succeed heavy rains.

As with the Anaheim disease, so with the mal-nero, nothing is positively known as to the cause of the malady. Opinion is still divided amongst Italian scientists as to whether mal-nero is due to the action of parasitic fungi or not, most of the Italian authorities being of opinion that these fungi are not the cause of the disease. In the Anaheim disease, fungi are abundant upon and in the diseased vines, but whether as cause or effect is not yet known. In this connection it may be remembered that the habits of some parasitic fungi, at any rate, are liable to change.

The fungus of white rot (*Coniothyrium diptodiella*) was at one time classed as a saprophyte only; it is now certainly known to be parasitic, and the fungus of black rot (*Læstadia Bidwellii*) has been found in parts of New York State, northern Ohio, and the islands of Lake Erie, to be rather saprophytic than parasitic in its nature.

The Anaheim disease has probably existed in this State for many years past. It was noticed in Napa County in 1887, and again in Napa Valley and Livermore Valley in 1889, but in each district vineyardists stated that it could not be the new disease, for it had been known to them for years, and had never done any harm beyond killing a few vines now and then, and that it would come and go. The same was found to be the case at Riverside, where, also, vineyardists stated that they had known that affection of the vines for years, and that sometimes a vine would die, and sometimes it would recover.

It will be seen from the above, that either there are considerable variations of the same disease, or else that more than one disease is at work; The different modes of attack, the different results in different parts of

the State, and the different appearances of the leaves of the diseased vines, are points not yet reconciled to each other. Professor Henri Grosjean, of the French Ministry of Agriculture, writing to Hon. J. DeBarth Shorb on the Anaheim disease, February 26, 1890, says: "We have not yet heard of a disease presenting the different characters described in Mr. Dowlen's letter, and we would not be surprised to be in presence of several diseases." Professor L. Paparelli, of the University of California, a pupil of Professor Targioni Toretti, writing May 19, 1890, says: "For my part, judging by the samples and description of the Anaheim vine disease, I should think that not the mal-nero alone is in question, but two or three maladies together, perhaps all of a non-parasitic nature." This question has also been referred to in Report No. 34.

With respect to remedies, partial success has been reached. In December, 1888, a small hothouse was erected by the Viticultural Commission, in which rooted vines, both healthy and diseased, of different varieties, were set out for observation and experiment. Unfortunately, soon after the vines had been set out, one end of the house was accidentally burned out, and almost all the vines were killed. Whilst the damage was being repaired, a second house was built onto the first, the cost being defrayed by the Los Angeles County authorities. By the middle of February, 1889, both houses were started with a fresh supply of cuttings and rooted vines of the varieties mostly grown in the district. Many of these were known to be diseased. Of the cuttings thirty-six were of the Mission variety. The rooted vines were several times treated with a mixture known afterwards as "Ongerth's powder." Part of the cuttings were also treated with this powder, and with modifications of it, both in solution and as powder. The cuttings were set out in rows of four each, two in each row being dressed, and two being left untreated to serve as checks. All the rooted vines grew well, and nearly all the cuttings started. By the end of April both houses were full of vines, and by the end of June the growth had so increased that quite a third of the rooted vines had to be taken out. Through the summer of 1889 the vines were left to themselves, except that occasionally they were supplied with a little water. In October, 1889, most of the vines were cleared out to make room for a fresh supply, when it was found that of the Mission cuttings nearly all the untreated plants were dead, whilst of the treated cuttings only two had died. All the rest had made large growth (completely hiding their dead companions), which was quite healthy. Three of these healthy plants were reserved. Of the rooted vines three Missions, diseased when put in, were quite healthy, and three Muscats and one Burger, also diseased when put in, were only very slightly diseased. These vines were all reserved, and, up to the present time, except for a little damage by sunburn to one of the cuttings and damage from gophers to one of the Muscats, these vines are all in good health. The treatment has been continued this year. Fresh vines, much diseased, were brought in during last December and January. Some of these were treated with various substances; others were untreated. At the present time, all the treated vines are in much better condition than those left untreated.

In the vineyards not so much success has been reached. Last year the above mentioned powder was applied experimentally on three vineyards, having a total of about one thousand acres. Three applications were made, one just before the vines started, one just after starting, and

a third in June. The disease had shown itself rather early, and after each application the disease was undoubtedly checked, and a new and healthy looking growth was induced, but by the end of the season the disease had apparently reasserted itself. The powder has been tried by different vineyardists, some of whom speak favorably, and others unfavorably of it.

Other substances have been tried—iron sulphates as a dressing to the ground, Bordeaux mixture, benzine introduced into the sap circulation, superphosphate of lime as a ground dressing. Some of these seem to have been of benefit for a time, others have had no appreciable influence.

The present outlook is encouraging. The vines were rather late in starting, but in all cases they have made excellent growth, with promise of a large crop of fruit; this is the case with all varieties, Mission included. Even where the vines were left unpruned, and the ground uncultivated, the vines having been condemned on account of their badly diseased condition, a strong, healthy looking growth has been made. The signs of disease in the early part of the year were very few, and there has been but little increase, and it is possible that the disease may pass away. But too much confidence must not be placed in this state of things, as the hot weather of the next three months may bring about a change for the worse, as the vines must of necessity be still in a very weak condition.

ETHELBERT DOWLEN.

JUNE 1, 1890.

The suggestion at the close of the above report, that "it would be well not to place too much confidence in the then condition of the vines," has unfortunately turned out to be only too well founded. Since the above report was written, the hot spells of June, July, and August have, in places, done considerable damage to the vines, though the total mischief should not be credited to the Anaheim disease, as drought and sun heat have each played a considerable part in the damage done.

ETHELBERT DOWLEN.

AUGUST 1, 1890.

REPORT OF J. B. J. PORTAL,

Special Agent to Investigate the Market for Dried Wine Grapes in Europe.

In 1888 the State Viticultural Commissioners resolved, in view of the depression then existing in the wine market, and the prospect of finding a market for California dried wine grapes in France, to give the whole subject a thorough investigation. Accordingly, Mr. J. B. J. Portal, a prominent vineyardist of San José, who was then going to Europe on business, was intrusted with a special mission to investigate this subject and submit a report. His reports came in from time to time, but in view of the recent and almost prohibitive tariff placed by France on products of this description, it is believed that the present chances of opening up a market in France are very slim indeed. The reports of Mr. Portal, and the letter of instructions given to him, are as follows:

LETTER OF INSTRUCTIONS.

San Francisco, Cal., April 29, 1889.

J. B. J. Portal, *Esq.*, *New York:*

Dear Sir: It having been represented to this Commission that you are now on your way from this country to France on business of a private nature, connected, however, with the development of commerce in California wines; and it being known to our Commission that you are familiar with the present condition of viticulture in California, by a unanimous vote of the Board during a special session held on the twentieth instant, you were specially requested to devote a portion of your time, or so much thereof as you can spare from private business, to the investigation of the following subjects:

First—To what extent is there a market in France for dried wine grapes for wine-making purposes, and to what extent may the same be increased, or rather to what extent may it be possible for the vineyardists of California to obtain a share of this market for their dried wine grapes.

Second—In what portions, or in what cities of France, is there a market for dried wine grapes; what is their relative importance in the trade; what is the present source of supply of dried wine grapes; what distinctions are there made in the various qualities as supplied by the trade, with respect to their relative market values—as, for instance, distinction relating to color, quantity of sugar contained, fine qualities for wine making, etc.; to be even more particular, would there be any distinction in value in dried grapes produced from Zinfandels, Missions, Rieslings, or Burgers.

Third—What are the names and business addresses of the persons engaged in importing, dealing in, and manufacturing for wine purposes, dried grapes in the most important sections and places in France engaged in that industry?

Fourth—Are the dried grapes required for this French market packed in any special manner, and are they required to be with or without stems?

Fifth—At what season of the year could dried wine grapes shipped from this State be utilized in France, or, in other words, would the element of time in transportation, whether by sailing vessel around the Horn, or by steamship via the isthmus of Panama, or by rail across the continent, materially affect the disposition of these products in France.

Sixth—Give us any information as to the value of California dried wine grapes, such as you know would be likely to be dried, in comparison with prices paid for dried grapes of different qualities from other countries.

Seventh—If you can conveniently devote a portion of your time to these questions, and report as early as possible, in time for the vintage of this year, you will render an important service to this State; and in order to aid you in this respect, this Commission respectfully commends you to the kind attention of all who may be able to give you information on these subjects.

Yours respectfully,

CHARLES A. WETMORE,
President.

Clarence J. Wetmore, Secretary.

FIRST PARTIAL REPORT.

MARSEILLES, FRANCE, June 11, 1889.

To the Board of State Viticultural Commissioners, San Francisco, Cal.:

GENTLEMEN: It takes a great deal of tact and time to get anything that a Frenchman calls a secret. However, I think by averaging the most contradictory opinions, I can give you the true manner of action at this time, so that you can take the responsibility of advising the vine growers and wine makers of California as to what they should do.

First—It is not profitable, at the present price of dried grapes in the French market, to ship from California. This price is 20 francs per one hundred kilos, delivered at Bordeaux, Marseilles, or Havre.

Second—No merchant will buy any dried grapes until a fair sample of at least one hundred pounds be sent to him for proper experiment. All say that they know nothing of dried California grapes, but are very willing to try them, and report at once.

I cannot give you here a full report of what I have seen and done at Bordeaux, Narbonne, Bezier, Marseillan, Marseilles, Cette, Montpellier, and Paris, but will later. I have the verbal opinions and business addresses of the most important merchants of the above dried grape centers.

My opinion is that the best interest of all concerned is to cultivate the American markets. There are here at Marseilles, merchants shipping dried grapes to New York, Mexico, and South America, and to many other places, that on account of their position should be supplied by California.

It would be advisable to dry a small lot of each kind of grapes and send them to France next winter, so that California, after proper reports, could be ready for the market, if any should develop in the future.

If you desire me to investigate the market in New York, let me know, and I will stop there on my return to California in July.

I regret very much that my report is so discouraging, but these are the facts, and the investigation has been thorough.

I remain, gentlemen, yours respectfully,

J. B. J. PORTAL.

SECOND REPORT.

SAN JOSÉ, CAL., March 4, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: In my letter to your honorable Board from Marseilles, France, I promised some additional facts when the supplies of dried grapes sent by your Commission to me in Paris should have been received and properly analyzed. I will endeavor to answer the questions in the order as per your letter of instructions, dated April 29, 1889.

First—To what extent is there a market in France for dried wine grapes, etc. The market for wine grapes at present is very depreciated, and has been so for over a year. Unless there is material change, it is not possible for California vineyardists to obtain a share of the little market now existing.

Second—The principal cities that now deal in dried grapes are, or have

been, Cette, Marseilles, Bordeaux, Marseillan, and Montpellier, and are supplied principally by Greece and Turkey in Asia at from 15 to 20 francs per hundred kilos. No particular variety is demanded, but the price paid is always according to the highest degree of alcohol they contain. They go from 28 to 34 liters of alcohol per one hundred kilogrammes of raisins.

The principal grape that Turkey furnishes ranks between 28 and 30 liters of alcohol per hundred kilogrammes. Their best variety is the *Thyra*, and sells at 15 francs per hundred kilogrammes, net, at Bordeaux, Cette, and Marseilles.

Greece furnishes the *Corinthe* and other varieties of a higher quality than Turkey, and range in alcohol from 32 to 34 per cent, therefore commanding as high as 20 francs per hundred kilogrammes. But at these figures there is neither profit nor demand.

Third—The principal dealers in dried grapes are:

Talbot Freres, 73 and 74 Rue de la Rousselle, and 2, 4, 6, 8, and 10 Rue Reniere, Bordeaux.

Henri Flamisset, druggist, seul vendeur du sucre Zenamai et importeur de raisins secs, Comptoirs a Smyrne (Turkie d'Asie) a Patras (Grece) et 15 Rue des Menuts, Bordeaux.

Alphonse Bousquet, Quai Vaulan, Cette (Herault).

Frich et Dormont, Cette (Herault).

Pascal, Fabre & Co., Marseillan (Herault).

Jean Voisin, Marseillan (Herault).

Leon Barral, Prop'r de Vignes Americaines, 11 cours des Casernes, et 2 Rue Brenys, Montpellier.

Bessede Fils, Marseilles.

M. Dufour, 16 Rue d'Antin, Paris.

Fourth—The packing is simply in substantial sacks. It does not matter if the grapes are stemmed or not. They may bring a little more without the stems.

Fifth—The fast transportation of dried grapes from California to France will only add to the cost of the product, as the market is about even all the year round, and the European crop being nearer the market, would always be ahead of the California product. It appears to me that shipping around the Horn by sailing vessel would be the best mode of shipment.

Sixth—California grapes of an average quality, and of the kind shipped by your Commission to me in Paris, in June last—and analyzed at my request by the "Laboratoire de la Societe des Agriculteurs de France," showing that one hundred kilogrammes produced 39.75 liters of absolute alcohol—would naturally bring the highest price in Europe, being higher than any other grape sent there up to this time.

I did not see the grapes myself, as they arrived too late, but I had them analyzed by the best authorities known, as you will see by the return of analysis marked 6,148:

REPORT OF ANALYSIS. (Translated.)

LABORATORY OF THE SOCIETY OF AGRICULTURE OF FRANCE,
336 Rue Saint Honore, Paris.

Specimen of dried grapes submitted by M. Dufour, of 16 Rue d'Antin, Paris, and received the twenty-first of September, 1889. Composition:

Glucose (inverted sugar)........63 per cent.

One hundred kilogrammes of these raisins has the equivalent of 39.75 liters of absolute alcohol.

Respectfully submitted.

J. B. J. PORTAL.

FINAL REPORT.

SAN JOSÉ, CAL., August 30, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I think that at the time of my last report to your honorable body on the dried grape question, with which I have been charged, the conditions of the market were less favorable in tone than they are already this season. France, Germany, and England are inquiring at what figures California dried wine grapes—red or white—can be obtained, while our home market seems to increase rapidly, and orders have been already received for the 1890 crop. There are now several establishments in London and in Germany organizing to utilize large quantities of dried grapes, and as the analysis made at my request by the Agricultural Analyst of the French Government has proved the California grapes to be higher in alcoholic product than any others introduced into the French market, it is reasonable to expect that in the years 1890 and 1891 large contracts will be made in California at remunerative figures for all the dried wine grapes that can be produced in the State.

Respectfully submitted.

J. B. J. PORTAL.

RAISINS.

An address delivered by B. N. Rowley, Esq., at the Seventh Annual Viticultural Convention, August 14, 1889.

There is some talk at present of overproduction of raisins in California, and that the planting of grapes for raisin purposes should at once cease. Let us glance over the situation, reviewing the raisin-producing districts of California, sections where the raisin grape grows to perfection, and where the climatic conditions are such that raisin making can be carried on successfully in all its branches.

Aside from the districts already occupied, there are some remote outlying districts or sections in the State that will some time in the future be brought within the scope of what might be properly termed "raisin-producing districts." The further extension of our transportation facilities will bring this about. At present the producing and curing districts of California are limited to Fresno, Tulare, Woodland, Yolo, Riverside, and portions of San Bernardino County, the El Cajon Valley of San Diego County, and the Santa Ana, Tustin, Orange, and McPherson Districts of Los Angeles. The latter is practically out of the field for some years to come at least, the vines having been destroyed by disease. Four years ago this section had an acreage equal to the production in 1888 of four hundred thousand boxes of raisins. Unfortunately the vine disease reduced this possible yield to the small quantity of forty thousand boxes, with the prospects of a smaller yield in 1889.

It is not possible to produce raisins in every section of the State where the Muscat and other varieties of raisin grapes grow to perfection. A section of the country in which the industry of raisin growing and curing can be successfully carried on, should be possessed of an even temperature and a dry climate during the ripening and curing season; should be devoid of cold and cloudy days, foggy nights, or showers and wind storms during the months of June, July, August, September, and October. These are combinations of climate, to say nothing of soil qualifications, that are not found at every cross road, even in California, so that we find the sections especially adapted to the cultivation of grapes for raisin purposes are limited even in our wonderful State.

A section of country selected for raisin making should be known as an early one; the bulk of the purchases of raisins are made from what is known as the "first crop," which should be cured and shipped for what is known as "early delivery." The first deliveries of the season, as a rule, prove the most profitable.

While the sections of country adapted to raisin making are limited in number, they are subject to considerable expansion beyond the present point of production. The planting of raisin grapes has been engaged in very extensively during the season just passed, and the large acreage devoted to raisins in 1887 and 1888 has been very largely increased during 1888 and 1889. Without any doubt, the present acreage five years hence (1894 or 1895) will all be in full bearing, and will

represent a possible production of upwards of two million five hundred thousand boxes of raisins, including all kinds and grades. While there is at present and always will be a very full supply of common and poor grade raisins, the supply of choice "London Layers" and fancy grades will not be fully up to the demand for years to come. Out of the possible two million five hundred thousand boxes of raisins there will be but a possible eight hundred thousand boxes of "London Layers," or choice stock. Our population is increasing largely year by year, and hence the natural increase in the consumption of raisins will be large. Naturally, when "Old Spain" produces very large crops, and they are permitted to be thrown upon the American market, prices will rule low. There is a remedy for this through the proper adjustment of our tariff laws.

The question is frequently asked, "Will it pay to plant raisin grapes, and further increase our already large acreage?" To answer that question intelligently, you should be posted as to the quantity of foreign raisins that are imported into the United States annually, as well as the amount of raisins produced in the State of California, in order to arrive at a close approximation of the consumptive demand. In answer to the above, we would say that the growing of raisin grapes will always be found a profitable venture in California if properly attended to.

In planting a raisin vineyard, you must, in the first place, know where to plant; second, how to plant; and third, but not least, how to care for and cure the crop.

The quantity of raisins (foreign) imported into the United States for the seasons of 1887 and 1888 was forty million five hundred thousand pounds, equal to two million and twenty-five thousand boxes of twenty pounds each. The consumption of raisins in the United States for any one year is practically represented by the quantity packed in this State and the quantity imported from foreign countries during any one season. Figuring upon that basis, we place the consumptive demand at three million two hundred and seventy-five thousand twenty-pound boxes for the seasons of 1887 and 1888. The pack of raisins in the State of California for the year 1888 we place at one million two hundred and fifty thousand boxes.

A number of growers and packers have, by their close and careful application to the business, earned a lasting reputation for their California raisins, for which there will always be a good demand and ready market at paying prices. The grower who thoroughly understands the business in all its branches, grows, cures, and packs his own crop, will realize the largest returns. With the small grower this is impossible, for he cannot successfully pack and market his own crop.

The raisin business is divided into three classes:

First—The large grower who packs and markets his crop under his own brands.

Second—The grower who sells his crop on the vines, or cures it and sells it in the sweat boxes.

Third—The professional packer who is not a grower, but has grading and packing houses established in the various raisin districts throughout the State.

Few, if any, of the raisins imported from Spain reach this country as packed by the producers or growers in that country. The raisins are cured in the producing districts, packed and shipped to the exporters, who maintain large warehouses or repacking establishments, where the

goods intended for the export trade are regraded and repacked under the immediate supervision of the exporting merchants, who thoroughly understand the wants and requirements of the various markets and countries to which they ship.

As to the acreage at present devoted to raisin grapes in California, after spending considerable time and carrying on an extremely extensive correspondence, we place it at twenty-one thousand acres. This represents the vines of all the raisin districts of the State ranging from one to sixteen years of age, many of which will be in bearing this season. A considerable increase in the yield may be expected in the near future from the new vineyards that have been planted this season, and from the grafting of a large number of vines, heretofore devoted to wine purposes, with the raisin grape.

A healthy, well cared for raisin vineyard will produce, when in full bearing, an average of from five to six tons of grapes to the acre. There are several large vineyards in the State that average, year in and year out, better returns than this, while there are many vineyards the average of which does not exceed three to four tons to the acre. In a good year, under favorable conditions, it is safe to calculate four tons of raisin grapes to the acre. Figuring on a basis of twenty-one thousand acres of vines in bearing in this State, the annual yield would be one hundred and sixty-eight million pounds of grapes, out of which it is possible to make fifty-one million five hundred thousand pounds of raisins of all grades, which, if boxed, would fill two million five hundred and seventy-five thousand twenty-pound boxes. You will notice that we say "possible to produce." While it may be "possible," it is not probable that any such quantity of raisins will be produced, as there are very many reasons why such a production from the present acreage will not be realized for many years to come, if ever.

Now, let us consider the situation of our competitors at Malaga, Spain. This district produces a large, thin-skinned, finely flavored raisin, which has become famous the world over for these qualities, and virtually offers the only competition from which California growers need have any fear. The importation of raisins from Malaga into the United States has fallen off materially during the past seven or eight years. The reason for this is attributed by some to the fact that California raisins have so improved in quality and quantity that they have virtually driven the Malaga raisin out of the market. While it is a fact that California raisins have come in direct competition with the imported Malaga, and have exerted a powerful influence in the direction of reducing importations, yet it is not true that the noticeable decline in the receipts of raisins from that section is entirely due to the competition from California. The receipts of Malaga raisins into the United States commenced to decline about seven years ago—1882—at which time we were importing over one million boxes. The falling off in the importations has continued ever since, and in 1888, we find the quantity imported reduced to the small amount of about one hundred thousand boxes of twenty-two pounds each. The causes for this rapid decline are the ravages of insect pests, vine diseases, crop failures, and loss of money by producers.

The total crop of the Malaga District for the year 1878 was two million one hundred and eighty thousand boxes, and of this quantity the United States received one million one hundred and eighty-three thousand boxes. In 1879 the crop amounted to two million one hundred

and twenty-five thousand boxes. The United States received one million one hundred and forty-six thousand boxes. In 1880, the crop was two million and fifteen thousand boxes, and the United States received one million one hundred and fifteen thousand boxes. At this point the very noticeable falling off in the crop of Malaga raisins commenced. In the year 1881, there were produced one million eight hundred thousand boxes, and the shipments to the United States were one million boxes. In 1882, the crop was one million eight hundred and sixty-eight thousand boxes, of which the United States received nine hundred and sixty-eight thousand boxes. These statistics show the total crop of the Malaga District for the five years above mentioned to be nine million nine hundred and eighty-eight thousand boxes, while the receipts into the United States during that period were five million four hundred and fifty thousand boxes. This proves that we have been receiving and consuming more than one half of the total crop from Malaga, while England takes the credit of being the principal market, and only received during the same period nine hundred and twenty-five thousand boxes.

There is a prevailing impression that the cost of production at Malaga, owing to the low price of labor, is very much less than the cost of production in California. This is a mistake. While it is true that the Spanish crop is grown, cared for, and harvested by what is known as "European cheap labor," on the other hand, their methods of cultivation, manner of handling, curing, and packing their crop are such as to swell the cost of production to such a point that farmers barely make expenses, particularly at the present time, in the face of the active competition from California, where raisins are produced at a very reasonable cost, owing to our improved methods and labor-saving machinery.

The producers have been losing money on their shipments for several years past, and the fight they have had to make against vine diseases, insect pests, etc., has thoroughly discouraged them, and they have allowed the quantity and quality of the Malaga crop to materially decline. At this point we will quote from a private letter from Messrs. W. Bevan & Co., of Malaga, Spain:

"Within the next two or three years there will again be a large production of Malaga raisins; the improved and more economical methods of working the vineyards, harvesting, and shipping the crops will enable our farmers to produce a box of raisins, it is believed, cheaper than it can possibly be done in California."

Mr. Bevan, the gentleman we have just quoted, has just returned to his home in Spain, after an extended visit throughout the Eastern States and the State of California. While in this city, after having carefully inspected our raisin vineyards, he expressed himself as not only being well pleased, but agreeably surprised with what he saw, and stated that if it were possible for him to dispose of his holdings in Malaga that he would consider very seriously the matter of coming to California and engaging in the raisin business. "No place in the world," said Mr. Bevan, "holds out such promises for the future of raisin growing as does the State of California."

People in Malaga are alive to the California competition, and, we are informed, have induced English capital to come to their assistance. From a private letter we quote:

"While last season's crop, 1888, was a very small one, and this season's

will be but little better, preparations are being made with the expectations of a heavy business in Malaga raisins in the near future."

That other causes have been at work reducing importations of Malaga raisins other than California competition, is shown by the fact that in the year 1882, while there was a marked decline in the importations from Malaga, the production in California was less than one hundred and twenty thousand boxes of all grades. The year 1883 shows a still greater falling off, and the California crop amounted to but one hundred and forty-two thousand boxes. In 1884, when our total imports from Malaga amounted to but seven hundred and forty thousand boxes—a falling off of three hundred thousand boxes—the California crop amounted to only one hundred and seventy-five thousand boxes of all grades. Out of this production in California during the year 1884 there were but a possible fifty or sixty thousand boxes of "London Layers," or a grade that would come into competition with the product from Malaga.

As soon as the Malaga District recovers from the effects of insect pests and vine diseases, and again becomes productive, California growers will find Malaga a very formidable competitor. In 1887, California produced eight hundred thousand boxes of raisins, and of this amount about two hundred and fifty thousand boxes would represent the quantity of "London Layers" produced that would come into competition with those from Malaga. By this it will be seen that the total quantity of "London Layers" and fancy grapes produced in California, and the total quantity imported from Malaga during that year, were five hundred and thirty-six thousand boxes, or about one half the quantity usually imported during any one year from Malaga prior to 1882, when the failure of the Malaga crop commenced. During the year 1888, California produced one million two hundred and fifty thousand boxes of raisins, of which amount five hundred thousand boxes represent "London Layers" and other choice grades. Our total importations from Malaga during the year 1888 amounted to one hundred thousand boxes from a crop of five hundred and forty thousand boxes. Again, we find that the total production of choice grades of California raisins, and the total importations from Malaga, amount to but five hundred thousand boxes, or considerably less than one half our former importations from Malaga alone. The lesson to be learned from this is that California has not driven Malaga raisins out of this market, but that the production of Malaga raisins has materially fallen off in quality and quantity, and that other markets are taking more than heretofore.

In regard to raisins from the Valencia District, which is one of the largest producing districts in Spain, and from which the United States receives annually very large quantities of raisins, it must be said that they are of a low grade, and used principally for cooking purposes; and while we do not fear Valencia as an active competitor, it may be well to inquire into the production and situation at that point.

During the season of 1888, the crop at Valencia fell short of expectations, being considerably damaged by rain; but nevertheless the crop amounted to sixty-five million pounds. Of this amount the United States received thirty-one million pounds. In 1887 the crop was seventy-nine million pounds, and the United States received thirty-two million pounds. The largest crop produced at Valencia for many years was during the season of 1882, about the commencement of the decline at Malaga, when the Valencia crop amounted to eighty-three million pounds,

of which the United States received forty-three million pounds. From these figures it will be readily seen that Valencia would prove no small competitor, provided California raisins came into competition with those from Valencia. The quality of the Valencia raisin is such—owing to the small percentage of saccharine or grape sugar they contain, and their poor keeping qualities—that they will never rank as a competitor of the California raisins, which are notably rich in grape sugar.

In summing up, we find that we have not reached the point where California can be relied upon to supply the entire consumptive demand of raisins in the United States. This demand will naturally be on the increase. Vine diseases, insect pests, crop failures, and climatic causes generally, will reduce the output of our raisin crop somewhat. California growers can maintain the present high standard and reputation for California raisins, and we need not stand in any great fear of foreign competition; but before planting the entire remainder of the raisin-producing sections of this State with raisin grapes, it would be well to give due consideration to the facts and statistics which I have furnished you to-day for your consideration.

SUCCESS OF RESISTANT VINES.

Written especially for this Report by JULIUS DRESEL.

We are now in the midst of our vintage, and every one may judge for himself how dreary an aspect the vineyards present around Sonoma, a place famous all over the United States for the best wines in California. I therefore think it opportune to make some remarks about that strange sight of an intelligent community listlessly standing by, waiting for something to turn up, while the vineyards, once the pride of our eyes, fall dead, acre after acre, from the extended flats at the mouth of our lovely valley clear up to the tops of our lofty hills. It is strange, indeed.

Finally, something happy really turns up. The prices for grapes actually rise from 30 to 50 per cent. Zinfandel bring $15 to $17 and Gutedel and Rieslings, $18 to $20. Cabernet Sauvignon is in demand for even $27, but not to be had. Besides, there is good reason that similar prices will prevail for the next few years and better wine prices may follow in consequence.

With $15 and $20 per ton the wine grower can make his occupation a profitable one, and with this the main objection against replanting is void. The phylloxera has certainly lost some of its terrors since the resisting American stock has been planted and grafted with entire success on a stretch of over four hundred acres between Haubert's and Rufus' vineyards.

Twelve years ago Dresel & Co. began to introduce Lenoir from Texas, and Riparia, Herbemont, Elvira, and other resisting stock from Missouri, all of which were dropped in favor of Riparia, on account of its good growing qualities and remarkable adaptability to all kinds of soil. Riparia did equally as well on the hillsides and flats, in sandy or clayish as well as in loamy soils.

In grafting, its junction with the scion presented no difficulty. Stem and graft developed about evenly, and bear abundantly to the present day red or white grapes of French or German origin, of high flavor or of neutral character. At present, dead vineyards are more worthless than naked land. By renewing them with resisting stock, the value of the land may be raised to $300 and more per acre. Therefore, I advise replanting. Cuttings are cheap. Lenoir and Riparia may be had in Sonoma and Napa. They should be planted in the nursery for one year, remain two years in the vineyard, then grafted in the third year during March, April, and May, and in the fifth year they will bring a fair crop. Cleft grafting is quickly done; anybody can learn it easily enough. An experienced hand can finish from one hundred and fifty to two hundred in a day.

The most important thing to observe in grafting is: Cut the stock even with the soil, or better half an inch above it, and then heap the soil in a mound around the graft to protect it against wind and sun.

After the graft has taken, say in September, remove the mound and any roots that may have grown from the scion. Now the vine is perfect. If the grafting has been done below the surface of the soil, it will be necessary every year to dig around the plant and remove all roots that will form on the scion, or else these roots will draw the nourishment from the leaves to the detriment of the resistant roots below. Phylloxera will then appear, kill the upper roots, and the vine becomes sickly or dies.

I expressly state that we met, apart from the cost, no serious drawback in this replanting experiment of our one hundred and fifty acres, and assert that it would be a tedious search to find a single vine that has died. On the other hand, we will be pleasantly remunerated this year by the sale of fifty thousand gallons of wine raised exclusively on American stock.

In plain view of these facts, how is it possible that so many of my fellow wine growers in Sonoma Valley persistently decry my happy success in replanting, spreading the ridiculous report that the resistant stock in our vineyard was dying out as fast as the remnants of the old plantation? Is it not a curious freak of human nature to belittle a promising result, instead of sympathizing with an experiment that might redound by imitation to the general benefit of our devastated valley?

Colonel Gardner, of the Census Bureau, when taken through our vineyard, was astonished at what he called a wonderful crop of grapes in so young a vineyard, and he made a corresponding report to Washington about the success of resisting stock at Sonoma.

But those who still doubt the correctness of my statements, I refer to the testimony of so experienced viticulturists as Messrs. D. D. Davisson, O. W. Craig, Chas. Kohler, and John O'Brien, of Sonoma, and I. DeTurk and L. Burris, of Santa Rosa, who have visited our vineyard for investigation, and left convinced, as I am myself, that our fellow wine growers could do no better than replant dead vineyards with American resistant stock at their earliest convenience.

JULIUS DRESEL.

SONOMA, October 7, 1890.

TARIFF AND SWEET WINE BILLS.

Appended will be found the full text of the McKinley Tariff bill in regard to all alcoholic liquors, and of the "Sweet Wine bill," which was included in the tariff measure:

TARIFF BILL.

SECTION 329. Brandy and other spirits manufactured or distilled from grain or other materials, and not specially provided for in this Act, two dollars and fifty cents per proof gallon.

SEC. 330. Each and every gauge or wine gallon of measurement shall be counted as at least one proof gallon, and the standard for determining the proof of brandy and other spirits or liquors of any kind imported shall be the same as that which is defined in the laws relating to internal revenue; but any brandy or other spirituous liquors, imported in casks of less capacity than fourteen gallons, shall be forfeited to the United States; *provided*, that it shall be lawful for the Secretary of the Treasury, in his discretion, to authorize the ascertainment of the proof of wines, cordials, or other liquors, by distillation or otherwise, in cases where it is impracticable to ascertain such proof by the means prescribed by existing law or regulations.

SEC. 331. On all compounds or preparations of which distilled spirits are a component part of chief value, not specially provided for in this Act, there shall be levied a duty of not less than that imposed upon distilled spirits.

SEC. 332. Cordials, liquors, arrack, absinthe, kirschwasser, ratafia, and other spirituous beverages or bitters of all kinds containing spirits, and not specially provided for in this Act, two dollars and fifty cents per proof gallon.

SEC. 333. No lower rate or amount of duty shall be levied, collected, and paid on brandy, spirits, and other spirituous beverages, than that fixed by law for the description of first proof; but it shall be increased in proportion for any greater strength than the strength of the first proof; and all imitations of brandy, or spirits, or wines, imported by any names whatever, shall be subject to the highest rate of duty provided for the genuine articles respectively intended to be represented, and in no case less than one dollar and fifty cents per gallon.

SEC. 334. Bay rum or bay water, whether distilled or compounded, of first proof, and in proportion for any greater strength than first proof, one dollar and fifty cents per gallon.

SEC. 335. Champagne and all other sparkling wines in bottles, containing each not more than one quart and more than one pint, eight dollars per dozen; containing not more than one pint each and more than one half pint, four dollars per dozen; containing one half pint or less, two dollars per dozen; in bottles or other vessels containing more than one quart each, in addition to eight dollars per dozen bottles, on the

quantity in excess of one quart, at the rate of two dollars and fifty cents per gallon.

SEC. 336. Still wines, including ginger wine or ginger cordial and vermouth, in casks, fifty cents per gallon; in bottles or jugs, per case of one dozen bottles or jugs containing each not more than one quart and more than one pint, or twenty-four bottles containing each not more than one pint, one dollar and sixty cents per case; and any excess beyond these quantities found in such bottles or jugs shall be subject to a duty of five cents per pint, or fraction thereof, but no separate or additional duty shall be assessed on the bottles or jugs; *provided*, that any wines, ginger cordial, or vermouth, imported, containing more than twenty-four per centum of alcohol, shall be forfeited to the United States; *and provided further*, that there shall be no constructive or other allowance for breakage, leakage, or damage on wines, liquors, cordials, or distilled spirits. Wines, cordials, brandy, or other spirituous liquors, imported in bottles or jugs, shall be packed in packages containing not less than one dozen bottles or jugs in each package; and all such bottles or jugs shall pay an additional duty of three cents for each bottle or jug, unless specially provided for in this Act.

SEC. 337. Ale, porter, and beer, in bottles or jugs, forty cents per gallon, but no separate or additional duty shall be assessed on the bottles or jugs; otherwise than in bottles or jugs, twenty cents per gallon.

SEC. 338. Malt extract, fluid, in casks, twenty cents per gallon; in bottles or jugs, forty cents; solid or condensed, forty per centum ad valorem.

SEC. 339. Cherry juice and prune juice, or prune wine and other fruit juice not specially provided for in this Act, containing not more than eighteen per centum of alcohol, sixty cents per gallon; if containing more than eighteen per centum of alcohol, two dollars and fifty cents per proof gallon.

SEC. 340. Ginger ale, ginger beer, lemonade, soda water, and other similar waters in plain green or colored molded or pressed glass bottles, containing each not more than three fourths of a pint, thirteen cents per dozen; containing more than three fourths of a pint each, and not more than one and one half pints, twenty-six cents per dozen; but no separate or additional duty shall be assessed on the bottles. If imported otherwise than in plain green or colored molded or pressed glass bottles, or in such bottles containing more than one and one half pints each, fifty cents per gallon, and in addition thereto, duties shall be collected on the bottles or coverings, at the rate which would be chargeable thereon if imported empty.

SEC. 341. All mineral waters, and all imitations of natural mineral waters, and all artificial mineral waters not specially provided for in this Act, in plain green or colored glass bottles, containing not more than one pint, sixteen cents per dozen bottles; if containing more than one pint, and not more than one quart, twenty-five cents per dozen bottles; but no separate duty shall be assessed upon the bottles. If imported otherwise than in plain green or colored glass bottles, or if imported in such bottles containing more than one quart, twenty cents per gallon, and in addition thereto, duty shall be collected upon the bottles or other covering, at the same rates that would be charged if imported empty or separately.

SWEET WINE BILL.

SECTION 42. That any producer of sweet wine, who is also a distiller, authorized to separate from fermented grape juice, under Internal Revenue laws, wine spirits, may use, free of tax, in the preparation of such sweet wines, under such regulations and after the filing of such notices and bonds, together with the keeping of such records and the rendition of such reports as to materials and products, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may prescribe, so much of such wine spirits so separated by him as may be necessary for the preservation of the saccharine matter contained therein; *provided*, that the wine spirits so used free of tax shall not be in excess of the amount required to introduce into such sweet wines an alcoholic strength equal to fourteen per centum of the volume of such wines after such use; *provided further*, that such wine containing after such fortification more than twenty-four per centum of alcohol, as defined by section three thousand two hundred and forty-nine of the Revised Statutes, shall be forfeited to the United States; *provided further*, that such use of wine spirits free from tax shall be confined to the months of August, September, October, November, December, January, February, March, and April of each year. The Commissioner of Internal Revenue in determining the liability of any distiller of fermented grape juice to assessment under section three thousand three hundred and nine of the Revised Statutes, is authorized to allow such distiller credit in his computation for the wine spirits used by him in preparing sweet wine under the provisions of this section.

SEC. 43. That the wine spirits mentioned in section forty-two of this Act is the product resulting from the distillation of fermented grape juice, and shall be held to include the product commonly known as grape brandy; and the pure sweet wine which may be fortified free of tax as provided in said section, is fermented grape juice only, and shall contain no other substance of any kind whatever introduced before, at the time of or after fermentation, and such sweet wine shall contain not less than four per centum of saccharine matter, which saccahrine strength may be determined by testing with Balling's saccharometer or must scale such sweet wine after the evaporation of the spirits contained therein, and restoring the sample tested to original volume by addition of water.

SEC. 44. That any person who shall use wine spirits as defined by section forty-three of this Act, or other spirits on which the Internal Revenue tax has not been paid, otherwise than within the limitations set forth in section forty-three of this Act, and in accordance with the regulations made pursuant to this Act, shall be liable to a penalty of double the amount of the tax on the wine spirits or other spirits so unlawfully used. Whenever it is impracticable in any case to ascertain the quantity of wine spirits or other spirits that have been used in violation of this Act in mixtures with any wines, all alcohol contained in such unlawful mixtures of wine with wine spirits or other spirits in excess of ten per centum shall be held to be unlawfully used; *provided, however*, that if water has been added to such unlawful mixtures either before, at the time of, or after such unlawful use of wine spirits or other spirits, all the alcohol contained therein shall be considered to have been unlawfully used. In reference to alcoholic strength of wines and mixtures of wines

with spirits in this Act, the measurement is intended to be according to volume and not according to weight.

SEC. 45. That under such regulations and official supervision and upon the execution of such entries, and the giving of such bonds, bills of lading, and other security as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, any producer of pure sweet wine, as defined by this Act, may withdraw wine spirits from any special bonded warehouse free of tax, in original packages, in any quantity not less than eighty wine gallons, and may use so much of the same as may be required by him, under such regulations, and after the filing of such notices and bonds, and the keeping of such records, and the rendition of such reports as to the materials and products and the disposition of the same, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, in fortifying the sweet wine made by him and for no other purpose, in accordance with the limitations and provisions as to uses, amount to be used, and the period for using the same, set forth in section forty-two of this Act; and the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, is authorized, whenever he shall deem it necessary for the prevention of violations of this law, to prescribe that wine spirits withdrawn under this section shall not be used to fortify wines except at a certain distance prescribed by him from any distillery, rectifying house, winery, or other establishment used for producing or storing distilled spirits, or for making or storing wines other than wines which are so fortified, and that in the building in which such fortification of wines is practiced no wines or spirits other than those permitted by his regulation shall be stored. The use of wine spirits free of tax for the fortification of sweet wines under this Act shall be begun and completed at the vineyard of the wine grower where the grapes are crushed and the grape juice is expressed and fermented, such use to be under the immediate supervision of an officer of Internal Revenue, who shall make returns describing the kinds and qualities of wine so fortified, and shall affix such stamps and seals to the packages containing such wines as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury; and the Commissioner of Internal Revenue shall provide by regulations the time within which wines so fortified with the wine spirits so withdrawn may be subject to inspection, and for accounting for the use of such wine spirits, and for re-warehousing, or for payment of the tax on any portion of such wine spirits which remain not used in fortifying pure sweet wines.

SEC. 46. That wine spirits may be withdrawn from special bonded warehouses at the instance of any person desiring to use the same to fortify any wines in accordance with commercial demands of foreign markets, when such wines are intended for exportation, without the payment of tax on the amount of wine spirits used in such fortification, under such regulations, and after making such entries, and executing and filing with the Collector in the district from which the removal is to be made such bonds and bills of lading, and giving such other additional security to prevent the use of such wine spirits free of tax otherwise than in the fortification of wine intended for exportation and for the due exportation of the wines so fortified, as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury; and all of the provisions of law governing the exportation of distilled

spirits free of tax, so far as applicable, shall apply to the withdrawal and use of wine spirits and the exportation of the same in accordance with this section; and the Commissioner of Internal Revenue is authorized, subject to the approval of the Secretary of the Treasury, to prescribe that spirits intended for the fortification of wines under this section shall not be introduced into such wines except under the immediate supervision of an officer of Internal Revenue, who shall make returns describing the kinds and quantities of wines so fortified, and shall affix such stamps and seals to the packages containing such wines as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury. Whenever such wine spirits are withdrawn, as provided herein, for the fortification of wines intended for exportation by sea, they shall be introduced into such wines only after removal from storage and arrival alongside of the vessel which is to transport the same; and whenever transportation of such wines is to be effected by land carriage, the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe such regulations as to sealing packages and vehicles containing the same, and as to the supervision of transportation from the point of departure, which point shall be determined as the place from which such wine spirits may be introduced into such wines, to the point of destination as may be necessary to insure the due exportation of such fortified wines.

SEC. 47. That all provisions of law relating to the reimportation of any goods of domestic growth or manufacture which were originally liable to an Internal Revenue tax shall be, as far as applicable, enforced against any domestic wines sought to be reimported, and duty shall be levied and collected upon the same when reimported, as an original importation.

SEC. 48. That any person using wine spirits or other spirits which have not been tax paid, in fortifying wine otherwise than as provided for in this Act, shall be guilty of a misdemeanor, and shall, on conviction thereof, be punished for each offense by a fine of not more than two thousand dollars, and for every offense other than the first, also by imprisonment for not more than one year.

SEC. 49. That wine spirits used in fortifying wines may be recovered from such wine only on the premises of a duly authorized grape brandy distiller, and for the purpose of such recovery, wine so fortified may be received as material on the premises of such a distiller, on a special permit of the Collector of Internal Revenue in whose district the distillery is located; and the distiller will be held to pay the tax on a product from such wines as will include both the alcoholic strength therein by the fermentation of the grape juice and that obtained from the added distilled spirits.

REPORT OF CHARLES B. TURRILL, SECRETARY.

Read at the annual meeting, held June 9, 1890.

To the honorable Board of State Viticultural Commissioners:

GENTLEMEN: Custom, more than actual necessity, requires at this time a report from the Secretary of the Board. So established and smooth running has become the routine work of the Secretary's office, and so efficiently has it been managed by my predecessors, that upon assuming its duties a year ago I found but little to require change.

During the last year the correspondence addressed to the Commission has been fully up to that of previous years, as shown by the files of past correspondence, and has come from nearly all sections of California, as well as from different parts of our own country, from Europe, Mexico, Central America, and Australia. In all cases as full attention as possible has been given to all these various applications for information and advice, while foreign correspondents sending information have been properly thanked for the same.

The library of the Commission, which for completeness and the intrinsic merit and rarity of its volumes, is not only the most complete viticultural library in the State, but on this continent as well. During the year a number of additions have been made. Especially noteworthy among these is a set of reports of the Commissioner of Internal Revenue. The lack of funds has prevented the purchase of books, and only a few periodicals have been subscribed for.

The reports of the Commission have been sent to a large number of producers in various parts of the State who have applied for them. Complete sets of these reports have been sent to several libraries, scientific societies, etc., in different parts of the world, with the request that each send to this Commission such reports as they may have of their own publication. This method is already beginning to bear fruit, and has brought us reports of interest from Australia and elsewhere.

During the past year the Seventh Annual Viticultural Convention was held in the hall of the Commission, beginning August 13 and closing August 17, 1889. Much interest was shown in the proceedings in the afternoons and evenings, when papers were read by different viticulturists and freely discussed by those present. Two hundred and six samples of wines and brandies were exhibited at the Convention, and were carefully judged and reported upon by the committees. These reports, together with stenographic reports of the proceedings, are in the hands of your Secretary awaiting publication.

During the month of December, under invitation, there was conducted in a portion of the Viticultural Hall a most meritorious citrus exhibit by the producers of Placer County. Notwithstanding the inclement weather, thousands of visitors were attracted, all of whom also had an opportunity, which they improved, of inspecting the viticultural exhibit of the Commission.

Upon the invitation of the Commission, Major H. Gardner, Special Agent of the Eleventh Census of the United States, appointed to report upon the viticultural industries of the country, has had desk room in my office while in the city. I have rendered him all the assistance in my power in his work.

The Commission has received during the year the regular newspapers from various parts of the State, which have been kept on file. The thanks of the Commission are due to the publishers of these journals for their courtesy.

The series of scrapbooks started several years ago have been efficiently kept up by Mr. W. H. McNeil. These books, arranged by viticultural districts, and special subjects, are of great value, presenting, as they do, a current encyclopædiac account of the development of the State from the regular issues of the press.

I would respectfully urge the advisability of compiling a new directory of grape growers and wine makers. The directory published in 1888 has served a good turn, but it is now becoming somewhat obsolete, owing to many changes and removals among those whose names are therein, and also because there are a large number of new names to be added to the list. The work of getting out such a directory is considerable, and much time will have to be taken to do the work carefully and efficiently, but it seems that the advantages of having such a book brought up to date will well compensate for the labor and expense of its preparation and publication.

This Commission was invited to send delegates to a preliminary meeting called to take action regarding a California exhibit at the Columbian Exposition, to be held in Chicago, Illinois, in 1893. The delegates from this Commission, who could be reached in the limited time given by the notice, attended and took part in the proceedings, the outcome of which has been the call for a State Convention, to be held in San Francisco on September eleventh next. This Commission is one of the bodies invited to send five delegates to that Convention.

In closing, I desire to report that all the work of the Secretary's office is fully in hand, and everything has been attended to in proper season.

Respectfully submitted.

CHARLES B. TURRILL,
Secretary.

MINUTES OF THE VITICULTURAL COMMISSIONERS.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,
204 MONTGOMERY STREET, SAN FRANCISCO, March 10, 1888.

A special meeting of the Board was called to order on the above date at 10 o'clock A. M., Arpad Haraszthy presiding. The following Commissioners were present—Haraszthy, Wetmore, West, DeTurk, Krug, and Manlove. The Secretary being necessarily absent, the Chief Executive Officer was requested to take his place. The minutes of the previous meeting were read and approved.

Mr. Haraszthy stated that he had been requested to extend to California vineyardists the invitation of the Australian Government to participate in the World's Exposition to be held at Melbourne during the present year.

Mr. West then presented the following resolution, which was seconded by Mr. Krug, and unanimously carried:

Resolved, That we do hereby appoint Mr. F. Pohndorff as agent of this Commission to proceed to London, Bordeaux, and Spain, to carry with him samples of California viticultural products with a view to determine the opportunities of trade with those places; also to procure samples and make collections of wines, raisins, cuttings, and other products of interest and value for our study, the actual expense of such work to be defrayed by this Commission not to exceed the sum of $1,500; and be it further

Resolved, That we do hereby recommend to the honorable Commissioner of Agriculture for the United States the name of F. Pohndorff as an efficient agent for appointment by the Department of State at Washington as special agent to the International Conference at Madrid, to consider measures of importance concerning adulterations of the wine products of the world.

A special committee, consisting of Commissioners Manlove, Krug, and Wetmore, was appointed to instruct Mr. Pohndorff as to his duties in the respect referred to in the above resolution.

The Secretary was instructed to forward to Commissioner Colman a copy of the resolutions recommending Mr. Pohndorff for appointment to represent our interests at Madrid.

A communication was read from B. F. Clayton, of New York, to our Chief Executive Officer, asking for instructions regarding certain matters pertaining to viticulture, and our interests in New York. Respecting the above communication, Mr. Wetmore offered the following resolution, which was adopted:

Resolved, That this Commission do hereby appoint Mr. B. F. Clayton as local officer and agent of this Commission, to disseminate in the East information concerning our industry, and to carry out, so far as practicable, the policy of this Commission as instructed from time to time; to serve without compensation, and to report to this Board when convenient.

Resolved, That the Secretary be instructed to acknowledge gratefully the services of said B. F. Clayton performed in the past, and to notify him of the above appointment.

The following resolution was offered by Dr. Manlove, and was carried unanimously:

Resolved, That it is the sense of this Commission that so far as practicable and wise, all internal revenue taxes should be reduced or abolished, it being expressly understood,

however, that distinct principles, other than the collection of revenue solely, and in the interest of public morals, should govern the taxation of spirits; and,

Resolved, further, That there should be no reduction in the tax on spirits, except so far as grape brandy is needed for the preservation of pure sweet wines, and alcohol used in the arts.

Resolved, further, That it is of great importance that our delegation in Congress should consider also the wisdom of increasing the tax on spirits, and particularly such modifications of existing laws that may be necessary to encourage improvement in the quality of distilled liquors and the restriction of compounded and rectified goods, to this end the principle of indefinite bonding being capable of assisting in a practical reform.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, April 18, 1888.

A special meeting of this Board was called to order at the above date at 11 o'clock A. M. by President Haraszthy. The following Commissioners were present: Haraszthy, Krug, Shorb, West, and DeTurk; also, Chief Executive Officer Wheeler and Secretary C. J. Wetmore.

The Secretary read the resignation of Arpad Haraszthy as President of the Commission. After careful consideration the resignation was not accepted by a unanimous vote.

A communication was received from Dr. Vanderbeck offering to take charge of an exhibit of wines at the Melbourne Exposition, and stating his terms for doing so. On motion, the offer was not accepted.

A communication was also read from Mr. E. J. Howell, a wine merchant of London, and special correspondent of the London "Globe," offering his services as special agent of the Commission. On motion of Mr. West, Mr. Howell was appointed a special agent of this Commission at London, to serve without compensation.

President Haraszthy then handed in his report to the Governor for the year 1887.

Chief Executive Officer Wheeler reported that the reports of the Commissioners for 1887 would be sent to the State Printer in a few days; also, that the manuscript of the last Convention had already been sent to the State Printer; also, that he was having some translations made of French authorities on wine making, which, when published, would be for free distribution.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, June 11, 1888.

The regular semi-annual meeting of the State Viticultural Commission was held on the above date, Vice-President Wetmore in the chair.

The following Commissioners were present: Messrs. Wetmore, Krug, West, DeTurk, Shorb, Manlove, and Doyle; also, Chief Executive Officer Wheeler and Secretary C. J. Wetmore.

The minutes of the previous meeting were read and approved.

Vice-President Wetmore, from the Committee on Experimental Wine Cellar, reported that there was in the cellar a fine lot of wines selected from different parts of the State, and also some samples made by the Commission; that some of the wines were ready for bottling, and that they would not improve if left longer in the casks. The committee hoped that all the Commissioners would visit the cellar after the meeting adjourned.

The committee appointed to give instructions to Mr. Pohndorff, special agent of the Commission to attend the conference at Madrid, reported that so far they had not been able to do anything, owing to the fact that no word had been received from Washington, D. C., as to the time of holding the conference.

Chief Executive Officer Wheeler reported that the reports of the last Convention would soon be ready for distribution; also, that the report for 1887 of the Commissioners would soon be ready to be sent to the State Printer; also, that he had translated a treatise on wine making, by Ladrey, and that when published by the State Printer it would be for free distribution.

The Chief Executive Officer was instructed to confer with the Committee on Distillation, and prepare an essay on distillation, and to submit the same to the Board before publication.

The election of officers for the ensuing year then took place, resulting as follows: President, Charles A. Wetmore; Vice-President, I. DeTurk; Treasurer, Charles Krug; Secretary, Clarence J. Wetmore; Chief Executive Officer, J. H. Wheeler.

The following resolution, offered by Mr. Doyle, was adopted:

Resolved, That the Chief Executive Officer ascertain, and report to the Board, under what section of the Revised Statutes and department rulings cherry juice is admitted by the customs officers at a less rate of duty than distilled spirits, which form a component part of it of chief value.

Recess taken until 2 P. M.

On resuming business, Mr. Krug moved that the President appoint a standing Committee on Statistics, whose duty will be to supervise and direct the gathering of statistics in conjunction with the officers of the Commission.

The motion was carried, and the President appointed the following committee: Messrs. Krug, West, and Shorb.

President Wetmore then brought up the subject of a State Wine Exchange and Permanent Exhibit, and stated that he had given the matter considerable thought, and had sent out a prospectus to the members of the Commission after consulting with several members of the Board, and other wine growers. After explaining his ideas of such an exchange, and the manner in which he thought it should be run, Mr. Doyle offered the following resolution, which was unanimously adopted:

Resolved, That we approve of the suggestion of a Wine Exchange, to bring producers and buyers of viticultural products together and maintain a permanent exhibit of such products, and that a committee of three, of which the President shall be Chairman, be appointed to frame a detailed plan therefor, and report the same at the earliest opportunity.

The following is the committee appointed: President Wetmore, Shorb, and DeTurk.

The meeting then adjourned, to meet on the following day at 11 o'clock A. M.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, June 12, 1888.

The adjourned meeting of yesterday was called to order on the above date at 11 o'clock A. M. The following Commissioners were present: Messrs. Wetmore, West, DeTurk, Doyle, Shorb, and Manlove.

President Wetmore, Chairman of the Committee on Permanent Exhibit and Viticultural Exchange, reported that the members of the committee had consulted together and had agreed upon the following:

First—A commodious store should be rented on the ground floor, and with a good cellar, in a favorable locality.

Second—Transfer of all the present offices of the Commission to such store after fitting up suitable rooms by proper partitions, etc., reserving the larger portion of such store for

(*a*) Permanent exhibit of wines, brandies, raisins, and other viticultural products of California, together with maps, photographs, and other illustrated attractions for the general public.

(*b*) Sampling department, where an opportunity will be given to purchase and sample any of the products offered by producers, and admitted in accordance with rules governing the same; exhibitors in this department will be credited with proceeds of products sold at their regular trade prices, and profits of retailing same to defray expenses as far as practicable, and all surplus profits to be paid into the State Treasury. Visitors in the department to be guided only by their own taste or desires, aided by the catalogue; all interference on the part of the management and service in guiding taste or selection to be strictly prohibited; the management not to be responsible for unsold samples, except reasonable care of same, which shall be subject at any time to withdrawal by exhibitor after paying any necessary expense incurred specially with respect to them; such exhibits shall be subject also to be returned to the exhibitors at any time in accordance with the rules of this department. Sampling is also provided for in this department of such experimental stock as is the property of the State from the experimental cellar, as may from time to time be determined. Prices for retailing samples to be as fair as practicable, but so fixed as not to come into unfair competition with the ordinary retail trade. All attempts to use this department for the purpose of undercutting fair trade prices to be discouraged by strict rules, but every encouragement in favor of good prices for superior goods to be afforded in order to stimulate the production and care of fine products.

(*c*) Viticultural Trade Exchange, wherein facilities for producers, brokers, tradesmen, and wholesale merchants, to meet and examine products by sample, will be afforded, subject to special rule.

(*d*) Cellar for storage and experimental work.

Third—Management. The Permanent Exhibit and sampling to be under the general direction of a special committee, and managed by an officer of the Board, with such assistance as may be found necessary. In case this work is added to the duties of the Secretary, an additional compensation to be allowed for the same.

Fourth—The Exchange Department. To be organized by the Executive Committee of this Board, with power to associate with them an Advisory Board of Control from outside the Commission, whose rules shall first be reported to the Commission for approval.

After considerable discussion on the above plan, the following resolution, offered by Mr. Doyle, was unanimously adopted:

Resolved, That a permanent exhibition of viticultural products of the State be established in connection with the offices of the Commission in San Francisco; that the plan, outlined by the special committee just reported, be approved, and that it be referred to the Executive Committee, to prepare and adapt the details of such plan, and to carry out the same; that the premises under the Mechanics' Institute building, on Post Street, are deemed suitable for the purpose, and the committee are authorized to rent the same (unless more suitable ones be found), and fit the same up for the offices of the Commission, the permanent exhibition of products aforesaid, and with the view to the establishment of a Viticultural Trade Exchange on the same premises.

The President then appointed the following standing committees:

Executive Committee.—DeTurk, West, and Manlove.
Auditing Committee.—Manlove.
Finance Committee.—Doyle, Rose, and Shorb.
Vine Pests and Diseases of the Vine.—DeTurk, West, and Manlove.
To Confer with the Board of Regents.—Doyle, West, and Krug.
Distillation, Counterfeits, and Adulteration.—Shorb, West, and Krug.
Evils Resulting from the Introduction of Foreign Fruit Juices, as at Present Allowed.—Doyle, West, and DeTurk.
Raisins and Table Grapes.—West, Rose, and Manlove.
Experimental Wine Cellar.—Wetmore, DeTurk, and Krug.

Mr. Shorb then moved that a committee of three, of which the President should be the Chairman, should be appointed to wait upon Miss Kate Field and see if she would accept the office of lecturer for the Eastern States on the subjects pertaining to the wine industry, and if she would accept, to make satisfactory arrangements with her.

The motion was carried, and the following committee was appointed: Wetmore, Shorb, and Doyle.

On motion of Mr. Shorb, the Executive Committee was instructed to draft a set of resolutions showing the appreciation of this Commission for the work done in the past for the viticultural industry of the State by Arpad Haraszthy, late President of the Commission.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, October 26, 1888.

A special meeting of the Board was held on the above date, and called to order at 11 o'clock A. M. by President Wetmore. The following Commissioners were present: Messrs. Wetmore, Krug, and Manlove.

A. S. Hallidie, Commissioner to represent the State at the Paris Exposition, was present, and conferred with the members with reference to an exhibit of wines to be made at the Exposition. After discussing the subject, the Commissioners agreed to make a collection of wines and brandies, and forward them through Mr. Hallidie.

President Wetmore reported that at the last meeting of the Board the Executive Committee was instructed to take possession of the premises in the Mechanics' Institute building on Post Street, and fit the same up for a Permanent Exhibit and Viticultural Exchange. Since that meeting the Trustees of the Mechanics' Institute refused to rent the store for the purposes we wished it. He further reported that he had looked around for another place, and had secured Platt's Hall at a rental of $350 per month, and that the hall would be turned over to us about December 1, 1888. The action of the President was indorsed by the Commissioners present.

A communication was received from Peter Klein, proprietor of the Occidental Restaurant, offering to lease a portion of the hall for a café, in which a first class lunch would be served, and only such wines and brandies as were furnished by the Commission from the exhibits, charging the prices fixed by the exhibitors, with a small additional service charge. The communication was referred to the Executive Committee, with power to act.

The Chief Executive Officer reported that Mr. Shorb had consulted with the officers of the Commission in reference to employing an expert to examine into the vine disease in Southern California; that they had agreed that something should be done by the Commission at once, and had engaged Mr. Ethelbert Dowlen at a salary of $150 per month to examine the disease, and report on the same. On motion, the above action was indorsed.

Mr. Krug reported that wine making was about finished in his district; that white grapes had fermented well, but that they had had some difficulty in fermenting Zinfandels; also, that the wine made from Zinfandels was very light in color.

Dr. Manlove reported that the wine yield in his district was short; that a great many vineyardists had dried their wine grapes, and had received satisfactory prices for the dried product; and that unless good prices were offered for fresh grapes next year, nearly all of the wine grapes would be dried.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, December 12, 1888.

The regular semi-annual meeting of the Board was held on the above date, and was called to order at 11 o'clock A. M. by President C. A. Wetmore.

The following Commissioners were present: Wetmore, Krug, West, DeTurk, Doyle, Shorb, and Manlove; also Chief Executive Officer Wheeler and Secretary Clarence J. Wetmore.

The minutes of the previous meeting were read and approved.

A communication was received from Miss Kate Field stating that she would soon deliver her first public lecture, and that the expense of the same would be about $500. On motion of Commissioner Doyle, Miss Field was authorized to expend an amount not to exceed $500 in the necessary expenses of a public lecture, to be delivered as soon as possible in some eastern city, in the advocacy of California wines. Miss Field also wrote that she had recently introduced Miss Mary Anderson to sound California wines, and that the charming actress was delighted to find that her native State produces so excellent and pure a beverage. She also inclosed letters from many noted persons in the East to show that her work for the Commission was well received.

In referring to the disease which is devastating the vineyards of Southern California, Mr. Shorb stated that Mr. Ethelbert Dowlen, the expert appointed by the Commission to investigate the disease, was working very hard and was studying the whole disease from a scientific standpoint, but that up to the present time he had not discovered the true cause of the disease, but that he was positive it had not been caused by any insect. Mr. Shorb further stated that thousands of acres were being destroyed by the disease, and if it was not checked that all the vineyards of the south were doomed. He also was of the opinion that the same disease had appeared in the northern part of the State, and advised the other Commissioners to be on the lookout for it. He

thought that the Commission should use every means in its power to find out the cause of the disease, and, if possible, to check it. He further stated that he had written a letter to Hon. Norman J. Colman, Commissioner of Agriculture at Washington, D. C., asking the assistance of his department in the erection of a conservatory where the disease could be studied during the winter, and also that he send an expert to work in conjunction with the expert employed by this Commission. In answer to this letter, Mr. Colman had stated that the department could not furnish any money for building the conservatory, but that next spring he would send out an expert to assist the Commission in its work. Mr. Shorb also stated that through instructions from the Executive Committee of this Board, he had built a small conservatory where the temperature could be regulated and the green leaves forced out on the vines, and so the disease could be studied during the winter.

The Commission then indorsed the work done by Mr. Shorb, and on motion of Mr. Doyle, Mr. Shorb was appointed a committee of one to continue the investigation of the disease, and to correspond further with the Department of Agriculture at Washington, stating the importance of the work, and that the department should send on the expert at once, so that the work can be carried on during the winter.

On motion of Mr. Krug, the Chief Executive Officer was instructed to prepare a circular describing the disease, and to send it out at once to all the vineyardists of the State, with the request that they keep a lookout for the disease, and to report it immediately to this office when discovered.

The Commissioners then took up the subject of the Permanent Exhibit in Platt's Hall, and after considerable discussion the details outlined in the circular sent out by the Secretary were adopted, and on motion of Mr. Shorb the Secretary was made General Manager, with a salary of $150 per month, and to do the work of the Secretary without extra pay. The Executive Committee was instructed to carry out the plans as determined upon.

On motion of Mr. Krug, the following Committee on Legislation was appointed: Messrs. Doyle, Manlove, and West.

The President then stated that at the last meeting of the Board it was decided best to gather together representative samples of California wines and brandies, and send them as a State collection to the Paris Exposition, and he asked the Commissioners to take the matter in hand at once, and to forward samples from their districts to the Secretary, so that he may prepare them for shipment.

The Chief Executive Officer reported that he was making selections of dried Zinfandel grapes for the purpose of sending them to Paris and Bordeaux, in order to ascertain their value for wine-making purposes, and also to find out what sort of market there would be for large quantities of them.

Dr. Manlove stated that some dried wine grapes in his district had sold for 3¾ cents per pound by the carload, and also that the Chasselas and Burger made very fine dried grapes, and that the Zinfandel was one of the easiest to dry.

Mr. Krug reported that he was gathering statistics in his district, and would soon be able to hand in his report for 1888.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, March 31, 1889.

A special meeting of the Board was called by the President for the above date, to consider the resignation of the Chief Executive Officer, but there being no quorum present, the meeting adjourned to meet at the call of the President.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, April 20, 1889.

A special meeting of the Board of State Viticultural Commissioners was held on the above date at its office in Platt's Hall, and was called to order at 11 o'clock by the President, Charles A. Wetmore.

The following Commissioners were present: Wetmore, Krug, West, DeTurk, Doyle, and Rose.

The minutes of the previous meeting were read and approved.

Mr. DeTurk, Chairman of the Executive Committee, reported that the work of the present officers had increased so much that the committee recommended that all of the offices be filled; also, that full power should be given to the Executive Committee to act in cases of urgency, so that there will not be a necessity of calling so many special meetings of the Board. Acting on this report, Mr. Rose offered the following resolution, which was unanimously adopted:

Resolved, That all matters of detail involved in the execution of the work laid out by this Board, and in conformity with the defined policy as expressed by resolutions and the laws governing the Commission, and all other business of the Commission during the intervals between meetings, not otherwise provided for by the Commission at its regular or special meetings, shall be under the control of the Executive Committee, with full power to act in the name of the Commission. Said committee shall keep in a book in the office full minutes of its proceedings, with records of the work authorized or undertaken, which shall be subject to any member of the Board, and be laid before the Board at its next ensuing regular or special meeting, accompanied, when necessary, by a detailed report. The Board shall, at any time, have authority to change the action of the committee from the time such change is declared.

Mr. Doyle then offered the following resolution, which was carried:

Resolved, That on the written request of any two members of the Board, the Secretary shall call a special meeting of the Board, to be held within ten days after presentation of such request, stating therein the objects of the meeting as expressed to him by the members requesting the call.

The work so far done by the Executive Committee in organizing the Permanent Exhibit and café was indorsed, and the committee was requested to make detailed report of the work done and to present it at the next meeting.

Mr. J. H. Wheeler, having informed the members that owing to private business requiring his constant service he would be compelled to resign the office of Chief Executive Officer, his resignation was accepted, to take effect May 1, 1889, and on motion of Mr. Doyle, the President, C. A. Wetmore, was elected Chief Executive Officer.

Owing to the increase of work devolving upon the Manager and Secretary, and acting on the recommendation of the Executive Committee, that all the offices should be filled, Mr. Rose moved that Mr. C. B. Tur-

rill, Manager of the Chamber of Commerce of San Diego, be appointed Secretary, and that Clarence J. Wetmore be retained as Manager of the Hall and Experimental Cellar, the Manager to receive the same salary as heretofore fixed. The motion was unanimously carried.

J. B. J. Portal, of San José, who is on his way to France to attend the Paris Exposition, was made a special agent of this Commission to inquire into the dried grape business; to find out the quantity used in that country, and the possibilities of a market for our dried wine grapes. The sum of $200 was voted Mr. Portal to cover expenses in getting such information.

Mr. Krug moved, and the motion prevailed, that a State Convention be called as soon as possible, and that the time and arrangements be left with the Executive Committee.

On motion of Mr. West, the Executive Committee was requested, with the aid of the officers of the Board, to investigate the laws of different counties respecting the sale of fermented and distilled liquors, collecting the same, and showing the effect on public morals, and any amendments that should be made to make the same effective. Also, that the same committee should do all it could to find out the markets for dried wine grapes, and to coöperate with the Grape Growers and Wine Makers' Association in this work, and to lend them all the assistance possible.

The subject of a market for dried wine grapes was discussed freely, and was considered to be one of the most important works of the Commission for the ensuing year.

The Secretary was instructed to forward the thanks of this Commission to Miss Kate Field for her able lectures delivered in Washington, D. C., and Boston, and to send their greetings and well wishes.

The Commission then adjourned.

CLARENCE J. WETMORE,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, June 10, 1889.

The regular semi-annual meeting of the Board of State Viticultural Commissioners was held at their office, in Platt's Hall, at 11 o'clock A. M.

Present: Commissioners Wetmore, West, Manlove, and Doyle.

There being no quorum present, the Board adjourned to Tuesday, June 11, 1889, at 11 o'clock A. M.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, June 11, 1889.

The adjourned meeting of the Board of State Viticultural Commissioners was held at the office of the Commission, Platt's Hall, at 11 A. M.

Present: Commissioners Charles A. Wetmore, Isaac DeTurk, W. S. Manlove, John T. Doyle, George West, and L. J. Rose; also, General Manager C. J. Wetmore and Secretary C. B. Turrill. President Wetmore was in the chair.

The Secretary read the minutes of meetings held April 20, 1889, and June 10, 1889. By a unanimous vote these minutes were approved.

The minutes of a meeting of the Executive Committee, held June 10, 1889, were submitted and approved.

The next order of business was the election of officers for the ensuing year. The ballots being counted, the following result was announced: Charles A. Wetmore, President; Isaac DeTurk, Vice-President; Charles Krug, Treasurer; Charles B. Turrill, Secretary; Charles A. Wetmore, Chief Executive Officer.

It was moved by Commissioner West that the present appointed officers be continued in office, subject to the future action of the Executive Committee. The motion was seconded and carried.

Chief Executive Officer C. A. Wetmore reported progress in his department, and outlined a large amount of work which he wished to carry through. In his opinion, one of the most important things to be undertaken would be the preparation and publication of an original work on fermentation and distillation. He also thought it important to issue a work on hygiene, as related to the wine interest. He thought it would be a good thing to inaugurate a series of monthly lectures in the hall.

The report of J. H. Wheeler, late Chief Executive Officer,* was then read, discussed, and placed on file.

The report called up a general discussion of the disease. In the absence of Commissioner J. DeBarth Shorb, who had been appointed a special committee on the subject, Commissioner Rose described the manner of the spread of the disease, saying that it traveled with the wind, and that its effects were very sudden and fatal. He had noticed that different varieties of grapes were differently affected. Those whose fruit contained the largest amount of sugar were first to be attacked, and others in proportion, until the Zinfandel, having but a small proportion of sugar, resisted longest. His observations convinced him that the disease does not travel in the winter, but rather when the vines are in foliage. The vines die down from the top. He had noticed no vines exempt when surrounded by affected vines. The vineyards at Anaheim and Orange were practically destroyed, with but one small exception. The owner of this vineyard had treated his vines in some manner which he had not disclosed. Outside of the districts mentioned, about 10 per cent of the vineyards of Los Angeles County are destroyed. He had noticed no difference in the progress and effects of the disease, either on low land or on gravelly soil with good under-drainage. He thought a careful examination of the fungus found on the diseased vines in Los Angeles County, and of that supposed to be the same on vines in the northern part of the State, would disclose a difference.

Commissioner Wetmore suggested, in order to better compare the disease being studied by Mr. Dowlen under the supervision of Commissioner Shorb, and to identify it and to determine whether the same disease is prevalent in other parts of the State, that, in his opinion, it would be important to get Dr. H. W. Harkness, who is the best authority on fungoid growths in the State, to go to Los Angeles and report on the disease.

Commissioner Rose and the others present fully indorsed this plan, and as Mr. Wetmore stated that he would soon go to Los Angeles County

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* This report will be found elsewhere in this volume.

to personally inspect the infected district, it was decided that Mr. Wetmore should endeavor to get Dr. Harkness to go with him.

President Wetmore submitted a letter from Kate Field detailing her work in the East. After discussion, the matter was referred to the Executive Committee.

President Wetmore then brought up the matter of a State Convention. After discussion the subject was left with the Executive Committee. In the discussion Mr. Wetmore stated that he thought that only matured wines (1887 and older) should be exhibited at the coming Convention, as at former Conventions new wines had been exhibited and tested, and now we should devote more attention to the matured wines. This view was fully indorsed.

Mr. DeTurk favored a good exhibit of grapes in the hall during the grape season, as well as during the time of the Convention.

Chief Executive Officer C. A. Wetmore suggested that experiments be made in the manufacture of sherries in the experimental cellar. This matter was referred by the Board to the Chief Executive Officer, and he was authorized to take such action as he thought proper.

On motion of Commissioner Rose, duly seconded and carried, the President and Commissioner Doyle were authorized to take all necessary action in regard to getting special duties fixed on cherry juice, so as to regulate importations.

There being no further business, the Board adjourned.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, June 12, 1889.

Ordered by the President this day that all standing committees as at present constituted be continued, and that the members of the same are reappointed.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, December 9, 1889.

The regular semi-annual meeting of the Board of State Viticultural Commissioners was held at the office of the Commission, 216 Montgomery Street, San Francisco, on the above date.

Present: Commissioners C. A. Wetmore, Charles Krug, J. DeBarth Shorb, John T. Doyle, W. S. Manlove, and George West, and Chas. B. Turrill, Secretary of the Board. Commissioner I. DeTurk arrived during the reading of the minutes. President C. A. Wetmore was in the chair. On being called to order, owing to the fact that alterations were being made in the hall, the Board adjourned to the Occidental Hotel.

The Board reassembled in one of the reception rooms of the Occidental Hotel, Montgomery Street, San Francisco.

The minutes of the meetings held June 10 and June 11, 1889, were read and approved.

Commissioner J. T. Doyle made a verbal report on behalf of the committee appointed to take action in regard to getting special duties fixed on cherry juice. The recommendations made were later in the proceedings incorporated by Mr. Doyle in resolutions which he presented.

Commissioner J. DeBarth Shorb, as special committee on the Anaheim vine disease, reported the progress thus far made in endeavoring to ascertain the cause of the trouble and to find a remedy. Mr. Dowlen has from time to time reported to the Commission the progress of his work under Mr. Shorb's direction. Mr. Shorb stated that specimens of the diseased vines have been sent to the best experts in Europe, in the hope that they can give information, as it is feared that the complaint is mal-nero, a disease which has devastated the vineyards of Italy. Photographs of the disease, as it appears under the microscope, are being made for extensive circulation among the most noted savants of the Old World.

On motion of Commissioner George West, duly seconded, it was decided to vigorously continue to push the investigation of the disease in Southern California.

The Secretary then presented the following financial statement (made by the General Manager), which, upon motion, duly seconded, was received and placed on file:

The following will show the expenditures for the first four months of the forty-first fiscal year:

July	$2,343 18
August	1,514 80
September	1,835 11
October	1,579 45
	$7,272 54

Estimated expense for the remaining eight months of the year:

Rent	$2,800 00
Salaries	4,400 00
Southern California vine disease	1,200 00
Kate Field	200 00
State Analyst	800 00
Gas and water	480 00
Coal	60 00
Commissioners' expenses	250 00
Express charges	125 00
Postage, stamps, and incidentals	200 00
	$10,515 00

Making the expenses for the year as follows:

Amount expended from July to November	$7,272 54
Amount estimated balance of year	10,515 00
Total	$17,787 54

The amount appropriated by the last Legislature for the two years beginning with July 1, 1890, was $35,000, of which amount not more than $17,500 can be used the first year. Unless some of the expenses can be cut down for the balance of the year, there will be a deficiency at the end of the year.

After the report had been discussed by the members of the Board, on motion of Commissioner J. T. Doyle, duly seconded, it was

Resolved, That the State Analyst and his assistant be notified that owing to the scarcity of funds, and the pressing demands of other parts of the work of the Commission, the regular appropriation made for their services would have to be discontinued, greatly to the regret of the Commission, at the end of the present month.

The Secretary then read the report of the General Manager of the Exhibition Hall and Experimental Cellar,* which, on motion, duly seconded, was received and placed on file.

Commissioner DeTurk stated that he would leave for Washington, D. C., in a few days, and offered to do anything he could for the Board while there.

The Board then took a recess to 2:30 P. M.

On reassembling in the same place at 2:30 P. M., all were present who were present at the morning session.

President Wetmore read a letter from B. F. Clayton, of Washington, D. C., giving an account of the prospective outlook for legislation relating to California viticultural interests.

President Wetmore then submitted his report.†

After a full discussion of the report by all the members of the Board of Commissioners, John T. Doyle introduced the following resolutions:

Resolved, That in the judgment of this Board the Internal Revenue tax on distilled spirits should not be repealed, except as regards spirits used in the arts and fruit spirits used in the fortification of sweet wines and dry wines for exportation only.

Resolved, That no general reduction in the tax on distilled spirits intended for use as beverages should be permitted, except on fruit spirits, and on them only, so far as may be necessary to equalize cost of production between grain and fruit spirits. The abolition of the tax on fruit brandies should be opposed as a measure dangerous in the extreme.

Resolved, That our Congressmen should be impressed with the truth that the market value of alcohol controls the average market value of all ordinary wines, because alcohol is the base of all imitations of wine.

Resolved, That the relief demanded by the sweet-wine producers should be granted, but strictly limited to the producers at the original place of fermentation, and to a stated quantity, not exceeding fourteen per cent of alcoholic strength; wines so fortified, and containing not to exceed twenty-four per cent of alcohol, and should not contain less than four per cent of saccharine matter; no use of saccharine matter other than the pure product of the grape to be recognized as legitimate, excepting pure crystallized cane sugar, and no spirits for fortification to be free from tax, excepting pure fruit spirits. Producers of pure wine who ferment their own products should be permitted to procure fruit spirits free of tax, out of bond, for fortification, subject to careful supervision of the Internal Revenue officers to prevent fraud.

Resolved, That in our opinion the advantage to be gained by the privilege to fortify sweet wines free from taxation would not compensate for the harm that would be done by violation of any one of the principles stated above, or by failure to enforce any of the limitations and restrictions mentioned.

Resolved, That in amending the tariff, provision should be made taxing "fruit juice not containing alcohol, distilled or otherwise," at whatever rate Congress thinks fit to impose, and providing that "fruit juices containing alcohol, and not classed as wines or brandies," shall be classed as alcoholic compounds, which they really are.

Resolved, That Section 3328 of the Internal Revenue Act shall be amended so as to read as follows: "No. 3328. On all beverages containing alcohol, designated or sold as wine, or as a substitute for wine, not made from grape juice and prepared in accordance with methods recognized as legitimate in standard published works on the subject, there shall be levied and collected," etc., as in the present section; "*provided*, that beverages made from the juice of fruits or berries, in accordance with approved methods, shall be exempt from tax if labeled or branded with the name of the fruit from which the same was made," etc.

Resolved, That the bonding period for brandy should be extended to five years.

Mr. Wetmore presented the following:

Resolved, That ample facilities under Internal Revenue regulations to prevent fraud should be given for the fortification of any kind of wine, for exportation only, free of tax, provision being made against reimportation of the same without paying tax.

The resolutions introduced by Messrs. Doyle and Wetmore were seconded and passed with but one dissenting voice.

Commissioner Shorb, in voting, explained that he differed from his colleagues only in one particular contained in the resolutions introduced

*This report will be found elsewhere.

†This report related to the proposed Sweet Wine bill, and will be found elsewhere.

by Mr. Doyle, viz.: if the Sweet Wine bill could not be passed without conceding the use of grain spirits as well as of fruit spirits free from tax for fortifying sweet wines, he would be willing to make this concession rather than lose the bill.

It was moved by Commissioner John T. Doyle, duly seconded and unanimously passed, that a committee of three be appointed to draft a letter to the Senators and Representatives of California in Congress, setting forth the legislation desired on the part of the Commission. The committee appointed consisted of Commissioners John T. Doyle, George West, and J. DeBarth Shorb.

There being no further business before the meeting, the Board adjourned.

CHARLES B. TURRILL,
Secretary.

BOARD OF STATE VITICULTURAL COMMISSIONERS,
SAN FRANCISCO, June 9, 1890.

The regular annual meeting of the Board of State Viticultural Commissioners was held at the headquarters of the Commission, Platt's Hall, 216 Montgomery Street, San Francisco, at 10:30 A. M.

The following Commissioners were present: Isaac DeTurk, G. G. Blanchard, J. DeBarth Shorb, George West, John T. Doyle, Charles Bundschu, E. C. Priber, and R. D. Stephens.

Charles Bundschu took his seat, vice Charles A. Wetmore, for the San Francisco District.

E. C. Priber took his seat, vice Charles Krug, for the Napa District.

R. D. Stephens took his seat, vice Wm. S. Manlove, for the Sacramento District.

L. J. Rose was absent. G. G. Blanchard was not present at roll call, but came in at the part of the proceedings at which his arrival is mentioned in these minutes.

A quorum being present, the Board was called to order by Vice-President Isaac DeTurk, who presided during the meeting.

Secretary Charles B. Turrill, General Manager Clarence J. Wetmore, Chief Executive Officer Charles A. Wetmore, and representatives of the press were also present.

The meeting was called to order by Vice-President DeTurk at 10:30 A. M.

The Secretary read the minutes of the meeting of the Board, held December 9, 1889, except the report of Charles A. Wetmore therein, which, by unanimous consent, he was excused from reading. The minutes were approved as read.

The Secretary then read the report made by Ethelbert Dowlen, and submitted by Commissioner J. DeBarth Shorb, this report being numbered forty-two in the series of Mr. Dowlen's reports made to the Board.*

After the reading of the report, it was moved by John T. Doyle, that wherever in the report the word "California" appears, as applied as a name to the disease, the word "Anaheim" be substituted by the Secretary. The motion was seconded and carried. The report as amended

* This report will be found printed elsewhere.

was then, on motion of John T. Doyle, duly seconded, received, and ordered placed on file.

At this point of the proceedings, J. DeBarth Shorb asked the privilege of introducing Mr. C. Furley Oldham, of England, who has been visiting various points in California for the purpose of making arrangements looking to the further introduction of California wines in England. On motion of Mr. Shorb, duly seconded, it was unanimously resolved to suspend the regular order of business and listen to Mr. Oldham's account of his experience in introducing California wines into England.

Mr. Oldham thereupon made a very interesting address, explaining the difficulties he had met with and had overcome, in placing California wines on the English market. Among other things, he stated that while, as a rule, the English do not drink much white wine, he had found that the California white wines met with a hearty reception.

At the conclusion of Mr. Oldham's remarks, John T. Doyle moved that a vote of thanks be extended to Mr. Oldham for his very entertaining and instructive address. The motion was seconded and unanimously carried.

During Mr. Oldham's speech, Commissioner G. G. Blanchard arrived and took his seat.

On the resumption of the regular order of business, the Secretary read the report of the Manager of the Exhibit and Experimental Cellar.*

After the reading of the Manager's report, on motion of John T. Doyle, duly seconded, the report was received and ordered placed on file.

The Secretary then read his annual report.*

After the reading of the Secretary's report, it was moved by John T. Doyle that the report be received and ordered placed on file. Motion was seconded and carried.

The Secretary then read the financial report made by Clarence J. Wetmore, Manager. It is as follows:

RECEIPTS AND EXPENDITURES FOR THE THIRTY-NINTH AND FORTIETH FISCAL YEARS, JULY 1, 1887, TO JUNE 30, 1889.

Receipts.

State appropriation		$30,000 00

Disbursements.

Salaries	$5,438 74	
Experimental work	2,228 29	
Reports	445 62	
Traveling expenses Chief Executive Officer	225 19	
Commissioners' expenses	251 45	
Conventions	438 60	
Library	373 15	
Statistics	160 90	
Distributing information	298 50	
Experimental Cellar	1,251 38	
Office expenses	13,127 71	
State Analyst	2,427 40	
Lectures	3,057 50	
		29,724 43
Balance unexpended		$275 57

Bill of E. C. Hughes, for $135, not approved.

*This report will be found elsewhere.

FORTY-FIRST FISCAL YEAR.

Expenditures from July 1, 1889, to June 30, 1890.

July, 1889	$2,343 18
August	1,514 80
September	1,835 11
October	1,579 45
November	1,203 31
December	1,442 65
January, 1890	1,213 25
February	1,548 15
March	1,191 35
April	1,215 48
	$15,086 73

Estimated Expenditures for May and June.

Salary	$1,100 00
Rent	700 00
Southern vine disease	450 00
Gas and water	80 00
Incidentals	200 00
	$2,530 00

Expended	$15,086 73
May and June (estimated)	2,530 00
Total	$17,616 73
Amount to be used	17,500 00
Deficiency	$116 73

After the reading of the Manager's financial report, Chief Executive Officer Charles A. Wetmore stated to the Board that he had agreed that any deficiency for the forty-first fiscal year should be deducted from his salary as Chief Executive Officer. Therefore, on motion of John T. Doyle, the financial report was received and ordered placed on file. The motion was seconded and carried.

The Secretary then read the report of the Chief Executive Officer.*

After the reading of C. A. Wetmore's report it was moved, by John T. Doyle, that the report be received and ordered placed on file. It was carried.

On motion of J. DeBarth Shorb, duly seconded and carried, the Board hereupon took a recess until 2 P. M.

The Board reconvened at 2:10 P. M. Present: all the Commissioners who were present at the morning session; I. DeTurk was in the chair.

John T. Doyle moved to suspend the regular order of business and proceed to the election of officers of the Board. The motion was seconded and carried by a vote of four ayes and three noes.

The Chair announced that the first officer to be elected was President.

George West nominated I. DeTurk.

E. C. Priber nominated Charles Bundschu.

There being no other nominations, the members prepared their ballots, which were collected and counted. Seven ballots were cast, as follows: I. DeTurk, four; Charles Bundschu, two; J. DeBarth Shorb, one.

It was moved by E. C. Priber that the vote be made unanimous in favor of I. DeTurk for President. The motion was seconded and passed. The Secretary thereupon announced that I. DeTurk had been elected President of the Board.

*This report will be found printed elsewhere.

The Chair then announced that the election of Vice-President would be the next business in order.

John T. Doyle nominated J. DeBarth Shorb.

J. DeBarth Shorb withdrew in favor of George West.

There being no other nominations, the members prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: J. DeBarth Shorb, six; George West, two.

The Chair announced that J. DeBarth Shorb had been duly elected Vice-President of the Board.

The Chair then announced that the election of the Treasurer would be the next business in order.

George West nominated John T. Doyle.

Charles Bundschu nominated E. C. Priber.

There being no other nominations the members prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: John T. Doyle, six; E. C. Priber, two.

The Chair announced that John T. Doyle had been duly elected Treasurer of the Board.

The Chair then announced that the election of Secretary would be the next business in order.

John T. Doyle nominated Charles B. Turrill.

George West nominated Winfield Scott.

There being no other nominations the members present prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. B. Turrill, three; Winfield Scott, five.

The Chair announced that Winfield Scott had been duly elected Secretary of the Board.

The Chair then announced that the election of Chief Executive Officer would be the next business in order.

George West nominated Chas. A. Wetmore.

Chas. Bundschu nominated George Husmann.

R. D. Stephens nominated E. W. Maslin.

There being no other nominations, the members present prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. A. Wetmore, three; Geo. Husmann, two; E. W. Maslin, three.

The Chair announced that there had been no election on the first ballot.

Chas. Bundschu withdrew the name of George Husmann; the members then prepared their ballots, which were collected and counted. Eight ballots cast, as follows: C. A. Wetmore, four; E. W. Maslin, four.

The Chair announced that no choice had been made on the second vote. After speeches by R. D. Stephens, E. C. Priber, and John T. Doyle, supporting the two candidates, the members prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. A. Wetmore, four; E. W. Maslin, four.

The Chair announced that no choice had been made.

C. A. Wetmore asked the privilege of making a statement, which was granted. He stated that Mr. Maslin was already holding one State office, and could not legally hold another.

E. C. Priber moved that when the Board adjourn, it adjourn until to-morrow at 10 A. M., and that the Board then proceed to the election of a Chief Executive Officer. The motion was seconded. After discussion, Mr. Priber, with the consent of the second, withdrew his motion.

The Chair then announced that the fourth ballot would be taken. The members thereupon prepared their ballots, which were collected and counted. Eight ballots were cast, as follows: C. A. Wetmore, three; E. W. Maslin, five.

The Chair then announced that E. W. Maslin had been duly elected Chief Executive Officer of the Board.

It was moved by John T. Doyle that the regular order of business be resumed. The motion was seconded and carried.

The Secretary read a number of letters from various parties.

John T. Doyle moved that the matters therein be referred to the Executive Committee. The motion was seconded and carried.

President Isaac DeTurk then announced the following committees:

Executive Committee.—George West, G. G. Blanchard, John T. Doyle.

Auditing Committee.—J. DeBarth Shorb.

Finance Committee.—L. J. Rose, J. DeBarth Shorb, John T. Doyle.

Committee on Vine Pests and Diseases of the Vine.—George West, E. C. Priber, J. DeBarth Shorb.

Committee on Distillation, Counterfeits, and Adulterations.—J. DeBarth Shorb, George West, Charles Bundschu.

Committee on Table Grapes.—George West, L. J. Rose, R. D. Stephens.

Committee on Experimental Wine Cellar.—George West, J. DeBarth Shorb, Charles Bundschu.

Committee on Anaheim Disease.—J. DeBarth Shorb.

Delegates to the World's Fair Convention, to be held September 11, 1890.—J. DeBarth Shorb, G. G. Blanchard, R. D. Stephens, Charles Bundschu, E. C. Priber.

J. DeBarth Shorb, George West, and John T. Doyle spoke regarding the investigation of the Anaheim disease, made by E. Dowlen. All of the speakers agreed that the work should be continued on the same plan thus far pursued.

John T. Doyle asked that the Executive Committee be instructed to secure the services of any other parties in the investigation of the Anaheim disease.

Under instructions from the President, the Secretary read that part of C. A. Wetmore's report which referred to asking the California delegation in Congress to pass the pending bill "authorizing the several States to control the sale of fermented and alcoholic drinks free from all interference on the part of the National Government."

George West asked Mr. Wetmore to make a statement regarding the matter. This Mr. Wetmore did.

It was moved by Mr. Doyle that it is the sense of the Board of State Viticultural Commissioners that all matters relating to the control of the sale of intoxicating liquors should be left to the several States. The motion was seconded by J. DeBarth Shorb, and carried.

The President was requested to notify the members of Congress from California of this action of the Board.

There was some discussion as to the action to be taken provided that E. W. Maslin should decline to serve as Chief Executive Officer, but no definite action was taken.

There being no further business, the Board adjourned.

CHARLES B. TURRILL,
Secretary.

APPENDIX.

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It was moved by John T. Doyle that the regular order of business be resumed. The motion was seconded and carried.

The Secretary read a number of letters from various parties.

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Committee on Distillation, Counterfeits, and Adulterations.—J. DeBarth Shorb, George West, Charles Bundschu.

Committee on Table Grapes.—George West, L. J. Rose, R. D. Stephens.

Committee on Experimental Wine Cellar.—George West, J. DeBarth Shorb, Charles Bundschu.

Committee on Anaheim Disease.—J. DeBarth Shorb.

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There being no further business, the Board adjourned.

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Secretary.

APPENDIX.

RESISTANT VINES BEST SUITED TO CALCAREOUS (LIMEY) AND MARLY SOILS.

Report of Professor Pierre Viala to the Minister of Agriculture at Montpellier, on his recent viticultural mission to America. Translated from the French.

DEAR SIR: By resolution of March 1, 1887, you have done me the honor to intrust me with a mission to the United States of America. The object of this mission was to search for varieties of vines which would thrive in calcareous or marly soils.

This mission has been rendered necessary by the failure of the attempts to utilize the actually known American vines, either as grafting stock, or as direct producers in the chalky soils, which cover a large area of the vine-growing district in Southern France, and particularly in the departments of the Charente; the possible outcome, however, of this mission appeared, and it must be added, with good reason, to be very doubtful. I will not enter, dear sir, into the details of the difficulties which I had to overcome during my researches in the United States, beginning with June 5th, and ending December 3, 1887. I will only recapitulate in this memoir the conclusion which I have drawn from my observations relating to the special object of the mission with which you have intrusted me, in order that the viticulturists shall be informed without delay about this matter. The numerous facts on which the following results (conclusions) are based, shall be brought forward in a report which is to follow, together with other viticultural studies which I have made in the United States—diseases of the vine, cultivation, vinification, economic and commercial questions, etc.

The first information which I obtained at Washington from the Department of Agriculture and from the United States Geological Survey did not give me much hope that I should find vines that would thrive in soils of a mainly calcareous character. Not only the geographical distribution of the native species was very little known, but it was also an established fact that in the United States there was an immense area, the greater part of which belongs to the cretaceous formation, which does not contain any chalk soils, similar to those of the Departments of the Charente and of the Champagne. Of the magnitude of the above mentioned area, an idea can be formed when we state that it stretches from Montana to the south of Texas; from the Rocky Mountains to the Mississippi, and comprises partly the States of Tennessee and Pennsylvania. As far as the marly soils are concerned, it is possible they have been formed by the decomposition of rocks which belong to the various geological formations, and that they are distributed quite irregularly over the whole area of the United States. Here I must state that during the six months which I have spent in the United States, I was able to take a survey but of a very small part of this country.

First of all it was necessary to find calcareous soils, which had to be, if not identical, at least similar to the calcareous and marly soils of France; further, to find native wild vines, which show a vigorous growth

in such soils. It was also necessary that these vines should be able to resist the attacks of the phylloxera, that they should take the graft, and last, not least, that they could be multiplied by cuttings. Finally, it was desirable that these species or varieties should be already existing in France, in order to avoid costly importations of the same; besides, being sent out on a scientific mission, I cannot overlook this side of the question.

During the first period of my mission I have explored various regions of the States of New Jersey, Maryland, Virginia, North Carolina, New York, and Ohio. The species which grow wild in these States, as well as in all the States of the North and East, are: *V. riparia*, *V. æstivalis*, *V. labrusca*, and *V. rotundifolia*. This last mentioned species, which grows only in the sandy and moist soils of the Atlantic Coast, is of no value whatever; it has been known already a long time in France.

The *V. labrusca* (Linne) has never been found in good condition, except when in sandy soils, rich loams, or red fertile soils. In poor soils, for instance, yellow marls, it is destroyed in the long run by the phylloxera. This applies particularly to States of the North and of the East, where the frosts are severe during winter and spring. In the Southern States also it succumbs quickly to the attacks of the insect, even in tolerably rich soils. The same can be said of the varieties directly derived from the *V. labrusca*.

The wild *V. æstivalis* (*V. æstivalis* of Michaux and *V. bicolor* of Le Conte) thrives only in sandy or rich loams, also in red soils, which are rich and mellow. As soon as the soil is marly, clayey, calcareous, and dry, this vine shows little vigor, although its roots are not injured by the phylloxera.

The *V. riparia* (Michaux) is the most common species in the region between Canada and the frontier of the Indian Territory. Few specimens only of this vine are met with on the banks of rivers in the south of Texas. These species, when growing wild, reaches its full development when growing in the United States only in very rich soils. In red soils and in alluvial loams, the varieties, with cordated (heart-shaped) thick and glossy leaves, are thriving remarkably well, but the trunk, though stout enough, has never the thickness of the southern varieties. It is by studying the soils in which the numerous varieties (simple or complex) of the *V. riparia* naturally grow, that one becomes convinced that they can be of real value only when growing in rich soils. I have never noticed this hardy species in marly or white and dry calcareous soils. Only once I have seen growing the *V. riparia* in a calcareous soil; this was on Kellys Island, which is one of the isles of Lake Erie; but was not a strictly calcareous soil. It was in the fissures of the compact Devonian limestone, where rich alluvial earth had accumulated, that I noticed the *V. riparia*. When calcareous fragments were predominating, the vines were chlorotic; the same remark could be applied to the vines that are growing in the yellow marls of Sandusky. I have often noticed in the woods specimens of *V. riparia*, whose leaves were covered with phylloxera galls, and whose roots were infested by numerous phylloxera; but I have never seen a case of death of a vine belonging to this species, which was due directly to this insect. Not one of the varieties of the North and the East has therefore a value for the "calcareous and marly soils."

During the second period of my voyage in the United States, I trav-

eled over Tennessee, Missouri, Indian Territory, and California. Some important observations had been made in Tennessee and Missouri, but it was necessary to combine them in Texas.

The *V. rubra* (Michaux) or *V. palaraat* which is met with only in isolated spots, in the sandy and black loam's of the Merrimac and of the Mississippi (twenty miles north of St. Louis) and in Illinois, seems to be without any value as grafting stock, because it grows only in these very rich soils. Southwest of the Missouri and northeast of the Indian Territory I have observed the *V. rupestris* and its various hybrids, *Cordifolia rupestris*, *Riparia rupestris;* also the *V. lincecumii*. The *V. lincecumii* of Buckley (sometimes called *post oak*, or large-grained *æstivalis*) can have, through certain of its varieties, some value in the central regions of the United States, where particularly the black rot, the mildew, and severe frosts, have always rendered impossible, not only the successful raising of the European vines grafted on resistant stock, but also of certain American varieties.

It is my belief that the varieties of the *V. lincecumii* have no future whatever for any of the vine-growing districts of our country; their small productions compared with that of our vines, the harsh and unsavory taste of their berries, which are above the middle size but rather devoid of juice, justify this belief. Besides all that, this species grows only in rich or sandy soils, never in white calcareous, or yellow marly soils; this applies to Missouri as well as to Arkansas, the Indian Territory, and Texas. On the banks of rivers, and in the black soils of the prairies, as well as in the pebbly and siliceous soils of the rich hills of the Indian Territory, individuals of this species attain a fine development at the trunk.

The *V. rupestris* (Scheele), which begins to meet the botanist's notice only in Tennessee and west of the Missouri, occurs further towards the south in the Indian Territory and in Texas; there, also, numerous derived varieties are to be found. It grows generally in river beds, which are dry after springtime, where no arborescent vegetation exists. The bottom of these ravines consists of a siliceous conglomerate, or of hard limestone, mixed with some alluvium; these constituents form together a dry and rather poor soil. The *V. rupestris*, however, thrives tolerably well in such soils. The trunk, which is sometimes very thick, is always better developed than that of the *Riparias*, which grow in alluvial soils; its branches are deprived of their leaves at base and creep on the soil. It is in the same soils that the hybrids of this latter species grow, *Cordifolia rupestris*, *Riparia rupestris*, which were first observed and imported into France by Mr. Taeger.

These hybrids are as hardy or even hardier than *V. rupestris* and *V. riparia*. They grow sometimes in the cavities of calcareous rocks (Devonian or Jurassic), which hold only small quantities of alluvial earth. All these varieties may prove very valuable as grafting stock in certain poor soils, but I do not think they are adapted for chalky soils, for I have not noticed them in such soils. There is still another proof for this assertion. Whenever the ravines in which generally the *V. rupestris* and its hybrids are found have a bottom of friable limestone, these vines disappear.

The varieties of vines which are peculiar to Texas grow exclusively in cretaceous limestone. The cretaceous region occupies the north of Texas, from the Panhandle to the Rio Pecos in the south, and from New Mexico in the west, eastwards, where it is limited by a line which unites Sher-

man, Dallas, Austin, and San Antonio; there it joins the Rio Pecos, following the latitude of San Antonio. With the exception of some small areas which belong to other formations (Carboniferous, Silurian, and Cambrian) this whole territory belongs by its fossils to the cretaceous formation, which reaches besides fàr into New Mexico, Colorado, and Arizona, States which I had no opportunity to visit, and where interesting observations could have been made.

The surface soil of the great plains (prairies) has generally everywhere almost the same composition; it is a black earth of an extreme fertility. The subsoil is a white calcareous rock; this rock is fissured and possesses variable hardness, but is always soft and has in many instances a texture which is intermediate between tufa chalk and the chalk which is peculiar to the Champagne. This subsoil is more or less deep (as deep as five feet), but it often crops out on the surface, where it disintegrates rapidly and forms a white earth, which contains an admixture of small chalky stones and a small amount of humus. The soil which results from such a mixture, is not so rich as that of the departments of the Charente.

The above described cropping out of the subsoil occurs sometimes without interruption over large areas, particularly on the sides of hills which are higher than four hundred or five hundred feet. The great table lands, which form the summits of these hills, have a richer soil; there the limestone is mixed with a reddish earth and numerous flinty pebbles, which often occur in nodules in the cretaceous formations of the subsoil.

It is in these soils that grow: *V. berlandieri* of Planchon, *V. cinerea* of Engelmann, *V. cordifolia* of Michaux, *V. candicans* of Engelmann, *V. monticola* of Buckley, a new variety which has been considered a species by Mr. T. V. Munson, the *V. Novo-Mexicana*, and numerous hybrids which result from the very various crossings between these species.

The *V. Novo-Mexicana* (T. V. Munson), which was observed for the first time in 1847, in New Mexico, by A. Fendeer (herbarium of Cambridge), reminds one much of certain varieties of the *V. riparia*, and particularly of the *Solonis*. It occurs, according to Mr. T. V. Munson, in the part of Texas (Panhandle) which lies between New Mexico and the Indian Territory. I have observed but few plants of this species on the banks of the Red River. This vine grows in the soils of the cretaceous formation, but only in spots where black earth has accumulated, or in the alluviums of the banks of the great rivers; it is also in these soils that Mr. T. V. Munson has first found it growing. It will be perhaps of some value, on account of its luxuriant growth, as grafting stock; perhaps in this regard it will not be inferior to *Cordifolia rupestris*, *Riparia rupestris*, * * * in rich soils, but I do not think that it is fit for yellow marly or white calcareous soils. The same applies to the series of hybrids called *Champins;* they may result from the crossing of *V. rupestris* and *V. candicans*, or *V. rupestris* and *V. monticola* (Buckley).

I have observed the first mentioned varieties (*Rupestris* by *Candicans*) in Johnson County, in the beds of ravines, which are few miles west of Cleburne. They were growing in a soil which consisted of calcareous pebbles, with an admixture of a considerable quantity of rich alluvial earth.

The *Champins*, which result from the crossing of *V. monticola* and *V. rupestris*, and which are very hardy, grow in the same kind of soils as

the species I am going to mention now. The *V. monticola* of Buckley, (herbariums of Philadelphia, Washington, New York, Cambridge), which is nothing else but the *V. Montana* of the same author, or *V. Texana* of Mr. T. V. Munson, or *V. Foexeana* of Mr. S. E. Planchon, occupies only a very limited region in the southwest of Texas. It was observed by Buckley in Bell, Burnett, and Hays Counties; Mr. T. V. Munson has recently found it again in Bell and Lampasas Counties; it is asserted that it occurs also in Uvalde County, which is in the extreme southwest. I have noticed it in Lampasas and Bell Counties. The *V. monticola* (Buckley), which is very well characterized and quite different from *V. berlandieri* of Mr. Planchon, reminds one of some *Rupestris* varieties of rampant habitus. It is not common in the few counties where it exists, and its trunk and branches attain but a very feeble development. It is met with only on the table lands, where it grows in soils consisting of limestone fragments and numerous flinty pebbles, mixed with blackish or reddish earth. This species, it seems to me, has very little value as grafting stock for calcareous soils, on account of its feeble growth in the comparatively rich soils in which it occurs; as a direct producer it has no value whatever, notwithstanding its rather large pale rosy berries.

The geographical area of the *V. candicans*, or *Mustang*, comprises the whole south of the Indian Territory from the Arkansas River, and extends across the whole of Texas into Mexico. The *Mustang*, the hardiest of the vines which is to be found in the United States, does not thrive very well but on banks of rivers (Red River, Trinity River, Brazos River, and Rio Grande). Less frequently it occurs on cretaceous hillocks, but there, and in blue, very calcareous marl, it does not thrive as well as on the banks of rivers. It seems to me, altogether, that the *Mustang* variety is of less value for calcareous and marly soils than the three following species, on account of the difficulty in rooting the cuttings, even though special processes be used; still, it behaves well as grafting stock, and resists well the attacks of the phylloxera.

The three and only species which, by their actual behavior in their native soils, make me believe that they would do well in "calcareous and marly soils," are: the *V. berlandieri* (Planchon), the *V. cinerea* (Engelmann), the *V. cordifolia* (Michaux). I had already observed the *V. cordifolia* and the *V. cinerea* (sometimes called *Wichita*) in the argillaceous, or white marly soils (crawfish soils), which have been formed by the decomposition of rocks belonging to the Silurian and Devonian periods; these observations were made in Tennessee (Pleasant View and Ashland, in Cheatham County), and in the State of Missouri (near the village of Peocly, Pleasant Valley, on the western boundary of Jefferson County). These two species, which are common in the Eastern Central United States, are not to be met with beyond the Brazos River, which forms the southern limit of their occurrence in Texas. In the States of the East their trunks and branches grow much larger than is the case with *Riparias;* this applies particularly to the rich and deep sandy loams of the Mississippi, but they remain green and hardy in the poor and dry soils of Texas, where the soil and the subsoil consist of the white, brittle limestone, which we have mentioned already.

The *V. berlandieri* (Planchon), which by no means should be confounded with the *V. monticola* of Buckley, begins to make its appearance with few specimens only in the county of Johnson. This is the

species which, together with the *Mustang*, I have observed to be the most common in the whole of Texas south of the Brazos River, and far into Mexico; this means in a dry region where *V. cinerea* and *V. cordifolia* do not exist any more. The *V. Berlandieri* predominates in regions, the soil and subsoil of which are formed by the decomposition of cretaceous rocks, on which only some few rare plants grow and remain green, such as: *Melia azedarach, live oak, Quercus virens, smilax, Juniperus Virginiana*, etc.

V. berlandieri grows more vigorously in rich soils, just as the *Cordifolia* and the *Cinerea* do, but the first mentioned vine does not turn yellow in calcareous soils. In other respects, also, it can be compared to these two species, for it not only resists very well the phylloxera, but stands also very well grafting when it grows in chalky soils. I have seen very conclusive examples of this fact at Belton, where some Spanish vines, which had been grafted two years ago on four years old *Berlandieri*, were perfectly green and vigorous in these poor soils.

The *V. cinerea* and the *V. cordifolia* of the calcareous soils are particularly abundant in the region which comprises the counties, Collin, Dallas, Ellis, Hill, Tarrant, Parker, Johnson, and particularly in the neighborhood of the towns, Dallas, Fort Worth, Waxabachie, McKinney. The *V. berlandieri*, of the same geological formation, is particularly common in the counties, Bell, Williamson, Travis, Hays, Comall, and above all, in the neighborhood of the towns, Belton, Temple, Austin San Elmo, New Braunfels.

The varieties of the *V. berlandieri* and of *V. cordifolia*, which are met with on calcareous soils, possess as a rather special characteristic feature thick, cartilaginous leaves, the inner side of which has a golden yellowish green color. The *V. cinerea* has on the same soils less cordated and shorter, but more cartilaginous leaves, which besides have stiffer bristles. The hybrids between these three species, or between them and other varieties, appear to me to be of quality inferior to the original species, and I have observed them mostly in rather rich soils simultaneously with certain new varieties, which I do not think worth while to mention, on account of their inferiority.

Two more species had to be studied in their native soils, the *V. Californica* (Bentham) and the *V. Arizonica* (Engelmann).

The occurrence of the *V. Arizonica* is limited to the States of New Mexico and Arizona, which I had no opportunity to visit. The few attempts which were made in the vineyards of Northern California to replace by this species non-resistant stock, and which I have seen, impress me with the opinion that its qualities are to be compared with those of *V. rupestris*, as far as the question of adaptation is concerned.

As to *V. Californica*, whose vigorous growth and thick trunk are equaled only by the *Mustang*, I had an opportunity to study the same in the ravines (cañons) of the southern part of Los Angeles County. This vine grows only in rich and moist soils; it shows little vigor, and becomes chlorotic in poor and dry soils. The *V. Californica* would not offer much resistance to the phylloxera, as I was able to ascertain by several facts which I had observed in Napa County; in the southern California, which the phylloxera has not yet invaded, I have never noticed the insect on the leaves or roots of the *Californica*. I do not believe that the *V. Californica* will be of any importance for the vineyards of France. Besides, the majority of the California viticulturists,

who follow the processes which are used in our southern vineyards, restore their plantations, if the soil is rich, almost exclusively with varieties of the *V. riparia*.

From all this it is evident that only the vines which I have observed on calcareous soils can be of value as grafting stock. It has been always the great endeavor of the viticulturists of the East and Northwest to produce new varieties which would resist the black rot and the mildew. The severe frosts of the winter did not allow them to use anything but the varieties of *V. labrusca*, which are adapted for these regions, to which vine growing was limited to for a long time.

The California viticulturists, who were more favored by the climate, have (it must be mentioned here) never introduced into their country the direct producers from the East, but employ the French varieties. These reasons, combined with the habit of the eastern people to prefer foxy or sweetened wines, make them accept every day with great expectations each direct producer which is thrown on the market by the nurserymen, who try to improve the original varieties of *Labrusca*, either by crossing it with other varieties, or by seedlings. The fame, which certain of these new vines have acquired in the United States, has been often the unfortunate reasons for their introduction (adoption) by French vine growers.

Without entering into long details concerning these new direct producers, I believe it is my duty to say that the Niagara and the Empire State are varieties with white foxy berries, and inferior in quality to the Noah, which is already known in France. The Secretary loses almost all its fruit under the influence of black rot, and is badly affected by the phylloxera. The Montefiore has no more value than the Clinton, of which it is the parent; without value for our viticultural districts are also the varieties Duchess, Prentiss, Bacchus, Beauty, etc. The Yoakum and the McKee are nothing else but the Herbemont; the Robinson Seedling nothing but the Rulander. The Ironclad, which is far from being absolutely proof against the ravages of the black rot, is not as prolific a bearer as the European varieties, and yields an inferior and foxy wine. The Othello exists in the United States only in the collections of amateurs, and is not appreciated because the black rot, the mildew, and the drying up of the leaves in summer make its cultivation impossible; the same can be said of the Triumph. The Canada, Brant, Black Defiance, etc., are considered in the United States to be of little importance.

After my return from the United States, I remain still more convinced that we must particularly rely on the American grafting stock, in combination with our native species, in order to secure the restoring of our vineyards and to keep up the well deserved reputation of the French wines.

In summing up my statements, in order to bring forward clearly the practical facts which result from the preceding indications, I will say that for "calcareous and marly soils" the *V. berlandieri*, the *V. cinerea*, the *V. cordifolia* represent the grafting stock which offers the best chance for success.

These conclusions are based solely on the study of the soils in which wines grow in the United States. Still it could be that the facts which I bring forward would not stand the test of practical application in France, but I do not think so.

It could also be that other varieties, such as *V. Novo-Mexicana*, *Cordifolia rupestris*, *Hybrids champins*, would have some value in cretaceous

soils, as the elasticity of certain species, as far as the adaptation to certain soils is concerned, is well known, but I do not believe this either.

The *V. berlandieri*, the *V. cinerea*, the *V. cordifolia*, have, however, one fault: The cuttings from the typical species root only with difficulty, when they are multiplied by the ordinary processes. But, besides that, among the numerous varieties of this species certain varieties may exist which root easily. It will be possible, I believe, to multiply them by adopting methods which are already used in France and quite common in America; I refer to rooting the single eyes under glass, a process which is not expensive.

I would have certainly preferred to find vines which root easily, but not one of the species which possesses this quality remain green and vigorous in chalky soils.

Such are the principal facts which I have observed in the United States. Everywhere the Americans have facilitated my studies with a devotion which is above all praise, and I am sorry that at present I am not able to mention all those who have helped me. I cannot finish, however, this note without thanking Mr. T. V. Munson, Mr. Hermann Taeger, Messrs. Bush and Meisener. The impartial advice of Mr. Taeger has partly allowed me to solve the majority of questions on which I have reported to you, and I am happy to say they have agreed with my conclusions in the presence of facts, even if these facts should be contrary to their commercial interests. Last, not least, the Department of Agriculture and the United States Geological Survey at Washington have furnished me with valuable information, which greatly helped me to accomplish my task.

Mr. N. J. Colman, Commissioner of Agriculture of the United States, was not satisfied to put at my disposition everything which could advance my researches, but he delegated Mr. L. F. Scribner, Director of the Section for Vegetable Pathologic, to accompany me in all my explorations. Mr. L. F. Scribner has followed me constantly, and, although my studies were only of secondary interest to him, his devotion and help have not left me for a moment. It is not in my power to express how I appreciate this sign of benevolence which was shown to the French delegate by Mr. N. J. Colman and Mr. L. F. Scribner, and I can only express here my deep thankfulness.

Accept, dear sir, the expression of my entire devotion.

PIERRE VIALA,
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PARIS, December 17, 1887.

HOW TO DESTROY THE CALIFORNIA GRAPEVINE HOPPER.

The description of this insect and its habits are taken from "Harris' Insects Injurious to Vegetation," page 227, which reads as follows:

"The vine hoppers, as they may be called, inhabit the foreign and the native grapevines on the under surface of the leaves, on which they may be found during the greater part of the summer; for they pass through all their changes on the vines. They make their first appearance on the leaves in June, when they are very small, and not provided with wings, being then in the larva state. During the most of the time they remain perfectly quiet with their beaks thrust into the leaves, from which they derive their nourishment by suction. If disturbed, however, they leap from one leaf to another with great agility. As they increase in size, they have occasion frequently to change their skins, and great numbers of their empty cast skins, of a white color, will be found throughout the summer, adhering to the under sides of the leaves and upon the ground beneath the vines.

"When arrived at maturity, which generally occurs during the month of August, they are still more agile than before, making use of their delicate wings as well as their legs in their motion from place to place; and when the leaves are agitated, they leap and fly from them in swarms, but soon alight and begin again their destructive operations. The infested leaves at length become yellow, sickly, and prematurely dry, and give to the vine at midsummer the aspect it naturally assumes on the approach of winter. But this is not the only injury arising from the exhausting punctures of the vine hoppers. In consequence of the interruption of the important functions of the leaves, the plant itself languishes, the stem does not increase in size, very little new wood is formed, or, in the language of the gardeners, the canes do not ripen well; the fruit is stunted and mildews, and if the evil is allowed to go on unchecked, in a few years the vines become exhausted, barren, and worthless. In the autumn, the vine hoppers desert the vines, and retire for shelter during the coming winter beneath fallen leaves, and among the decayed tufts and roots of grass, where they remain till the following spring, when they emerge from their winter quarters, and in due time deposit their eggs upon the leaves of the vines, and then perish."

As observed in California, the hopper makes its appearance much earlier, and has been seen on the vines with the first warm weather of April. It continues its depredations even up to October, and has been observed infesting the rubbish of some vineyards all winter long. The most injury is done by them in defoliating the plant, thereby subjecting the grapes to sunburn and causing their failure to ripen. Their first appearance in spring is usually on the outside rows of the vineyard, particularly on those rows bordering grassy plots or uncultivated fields; from these they spread in a few weeks to the other portions of the field vineyard. With a knowledge of this fact the vineyardists may often head them off from a greater part of the vineyard by treating the first infested vines at an early date.

The ordinary operations of spring vineyard work, viz.: plowing, cultivating, and clod-mashing, destroy the eggs and larvæ of the insects, which are found on rubbish and leaves of the previous year, but they may still be looked for coming from the surrounding fields if such there are about. Burning the adjoining fields would prove a valuable auxiliary to their destruction.

THE REMEDY.

Little difficulty has been experienced of late in destroying insects which prey directly upon the foliage of the plant. A resort to poison, where it may be had, has usually proved satisfactory. The subject of this treatise, however, is much more difficult to eradicate, in that it derives its nourishment by sucking the sap from the cells, to poison which would mean the destruction of the same. Most prominent among the remedies proposed in the past few years have been spraying with toxical solutions, whale-oil soap being foremost. Sulphuring in the early part of the season has been advocated as a partial remedy. Carrying a lighted torch through the vineyard has also been suggested. An important aid to their destruction has been brought about by turning sheep into the vineyards in the fall, whereby the eggs and insects are eaten on the foliage or trampled under feet. This, however, has proved inconvenient in many cases, and cannot be recommended as a general remedy.

During the past week experiments have been conducted by myself at the "Olivina" Vineyard, near Livermore, where, with the assistance of Mr. Smith, the proprietor, I have been able to devise a means which proves a complete success.

First, however, to test the value of previous experiments, we resort to spraying, sulphuring, etc. The following solutions were employed:

First—One pound of whale oil, mixed with one pint of syrup, and then diluted with one gallon of water.

Second—One half gallon of syrup with one gallon of water.

Third—Two pounds of whale-oil soap to one gallon of water.

Fourth—Four pounds of whale-oil soap with one gallon of water.

Each and all of these were carefully applied to the infected vines by means of the Cyclone nozzle.

The strongest solutions of soap were such as to burn the tender leaves of the vine, so noticed a day or two later. The strongest solutions of the syrup likewise proved detrimental to the foliage; but with all, alike, the hoppers continued their work undisturbed. Twenty minutes after the applications were made (and they were made thoroughly), the hoppers were found on any and all of the vines treated, and in as great abundance as before. In many cases they had been forced to the ground by spraying, where it was thought the wings would become clogged, and their further recovery thereby prevented. A short time afterward, however, careful search revealed their absence from the ground, and remedies of this character were accordingly abandoned.

Sulphur has been dusted on the vine to such an extent as to render the foliage yellow, but shortly afterwards the hoppers were found uninjured, and continued so.

A torch carried at night has proved a failure.

EARLY MORNING TRAP.

A contrivance for holding petroleum in pans was then arranged so that it could be placed under the vine. This employed night and morning will prove an effective trap; for on shaking the vine the hoppers drop into the liquid, and so become destroyed. Still, the apparatus for this purpose must be so elaborate and expensive as to form a potent objection to its use for operations on a large scale. For this I therefore substitute a screen made out of green wire gauze, such as is ordinarily employed for window screens. The gauze should be stretched over a frame made of stiff wire, forming a screen circular in shape and about two and a half feet in diameter. A slot in one side will enable the screen to be placed immediately under the vine, the whole being attached to a stick in such a manner as to form a handle. We now have a trap for morning and evening work, for, by placing the screen under the vine, the hoppers will fall readily onto it; when there, they expire immediately if disturbed. Previously, the screen has been coated or smeared over with common kerosene. A piece of canton flannel or other heavy cloth, fuzzy side up, may be stretched under the gauze, and will serve to keep the screen oiled; for after some exposure the oil loses its property of killing at first contact. In fact, for this screen a cloth without the gauze may be employed, if desired.

THE MIDDAY TRAP—HOW TO MAKE A TRAP FOR MIDDAY WORK.

For day work, which is the time when most of the operations must be conducted where large areas are to be treated, a different contrivance must be formed. For particular instructions, the following will direct any one:

For short prune varieties, first: The operator should be provided with twenty feet one-fourth inch iron rod, or an equal length of heavier wire approximating to this in size. Cut two pieces seven feet long each and two pieces three feet long each. With these, two semi-spheres may be made with a diameter of about two feet (these measures may be increased proportionately to make a large trap). A strip of green wire gauze six feet long and three feet wide will answer to cover the trap. The gauze should be material commonly used in window screens, and worth about 2½ to 3 cents per square foot. Do not try substituting cloth for gauze, for our experiments proved it inapplicable. Bend the seven-foot length in a circle three feet in diameter, turning the ends together and twisting them outward to serve as a handle. Cross the circle with a second piece three feet long, which should also bend in a circle outward; this forms a semi-sphere. Now cover the whole with gauze, which may be sewed on like the parts to a cover of a baseball, attached by means of a string.

Make a second semi-sphere similar in every respect to the first, and such that the two when brought together form a complete sphere.

The circle of the first semi-sphere may be provided with a notch to accommodate the body or trunk of the vine, thereby enabling the operator to completely cover the plant and provide against the escape of the hoppers.

Care should be taken in forming the notch to see that it is so placed

in relation to the handle as to enable the operator to stand partly over the vine when bringing the trap together.

The gauze of this trap, if rubbed over with a cloth or swab saturated with kerosene, will retain enough to kill immediately the hoppers alighting thereon; experience has proved, however, that after a little exposure the kerosene loses its greatest effectiveness and the hoppers are therefore enabled to take a second jump, and assisted by falling may escape through the opening or joint below. To obviate this and avoid the necessity of replenishing the kerosene so often, a piece of flannel or similar cloth should be drawn tightly and sewed over the bottom part of each semi-sphere, the edges turning upward into the trap as it appears when closed, so that any of the victims tumbling down will lodge between it and the gauze, where the density of the oil will end their endeavors to escape.

ANOTHER AND BETTER FORM OF TRAP.

I find that for different vines, different shapes are preferred. The following described appliance is the best and most commonly used at the time of this writing, though somewhat more expensive than the first named:

Frame two semi-cylinders, using for this purpose iron bands one eighth inch thick and one half inch wide, which should be joined with rivets at the corners. These parts should be hinged together with small butts, which may be riveted to the frame, such that, when covered with green gauze, it may be opened and closed over the vines. This trap needs no top, but should be provided with a bottom of either heavy cloth or, what is better still, two semi-circular tin pans about one and one half inches deep, and so formed that in coming together to form the circle a space is left for the stump of the vine and stake, say eight inches long and three inches wide. A cloth or sponge should project from the edges of the hole to close completely about the vine when in use.

For vineyards under ten years old, and some even older, eighteen inches is a sufficient diameter for the cylinder, which should be about two and one half feet high to accommodate long primed varieties. The last dimension may, however, be modified to accommodate the shape of particular vines. A portion of the upper part of the frame left free will serve as handles, or these may be added if desired, in which case they should be attached near the upper center of each semi-cylinder.

Smear the gauze over with ordinary kerosene oil, to which a small amount of crude petroleum may be added if convenient, as this will serve to thicken it and render it more lasting; the oil to be applied by means of a brush or cloth as often as seems necessary.

The operator now approaches each vine cautiously, and, inclosing it in the trap, kicks the stump of the vine below, if using the spherical trap, or disturbing it above if the cylinder is employed, which causes the hoppers to fly off, and, encountering the gauze, come in contact with the kerosene, which kills them immediately, or causes them to drop to the bottom, where a second contact with the oil leaves them unable to move. The trap should be retained about the vine for a moment to insure the destruction of all the victims before opening it again for their escape.

In our work, after making the parts according to the above description,

and operating on a few vines, the green gauze was changed to a yellowish hue by the myriads of insects captured. Either apparatus is light and easily handled; they should not weigh over five pounds each.

With one appliance a man should get over several acres per day, and the total cost of treatment, including oil used, should not much exceed 50 cents per acre.

To use the trap with best success it should be employed at the present season. With the increase of foliage and enlargement of the vine the trap must also be enlarged, becoming more cumbersome and more difficult to wield, though equally effective.

Very windy weather should be avoided for this work, as many retreat into the ground at such a time, and the few remaining on the leaves are disturbed with great difficulty at such times.

When the air is still, or but little wind is blowing, and when the warm sunshine has removed the dew from the foliage, then is the most favorable period for general success.

A great advantage in early season work accrues from the destruction of the insects previous to the time of laying their eggs, thereby lessening the chance of damage.

Vines laying on the ground, like those pruned on the Chaintre system, or those tied to wires, would require a semi-cylindrical screen, lined with cloth at the bottom, which latter should be turned up to prevent their tumbling off, the screen being so formed as to cover the foliage. Extermination in this case would prove difficult, as we have no means of catching those which drop on the ground. But by operating in the heat of the day, and when a slight breeze would take them on the screen, the insect will fly to it and be completely entrapped by the oil which has been placed on the gauze and cloth.

Before closing this treatise, I desire to express particular acknowledgment to Mr. J. P. Smith, of the Olivina Vineyard, and to his foreman, for their kind assistance and interest in the experiments which have been conducted at Mr. Smith's place. To successfully accomplish our work has required no small degree of patience on their part, and I have to thank them for it, and for their advice in devising the different means tried.

The hoppers have increased in the Olivina Vineyard, during the past three years, to such an extent as to become alarming. Many leaves already put forth are withered by their attacks, and some other sections report a similar condition of affairs.

It is now my belief that prompt and energetic attention to the above detailed method will remove all fear of damage to the grape.

In the past two years the Commission has experimented with and provided ample remedies for all insects consuming directly the foliage of the plant. The arsenic and bran remedy enables us to meet the grasshopper plague successfully, and Paris green or London purple, mixed at the rate of one pound to one hundred and sixty gallons of water, will destroy other foliage-consuming insects, and has been proved innocuous to the fruit, vine, or raisin. The scribe, the flea beetle, and other insects, may likewise be trapped by the above described apparatus.

Up to this time, the vine hopper has proved a constant menace to the grower, but from this it is to be hoped dates our victory in the field.

J. H. WHEELER,
Chief Executive Viticultural Officer.

THE DESTRUCTION OF ANIMAL AND VEGETABLE PARASITES OF THE VINE.

Recommendations by the Chief Executive Officer of the State Viticultural Commissioners. A resumé of rules and remedies adopted to the present season.

The present being the season of greatest activity in the operation of combating vineyard pests and diseases, many of which appear so suddenly in some of our vineyards as to leave no time for the proprietor to waste in looking up the results of former experiments or remedies described in some lost paper or publication, it has seemed a fitting time to publish a brief abstract or summary of the principal vine pests abroad at the present moment, together with the best known means of destroying them.

CUT WORMS

May, if few in number, be found at night with the aid of a lantern, when they are preying on the leaves or young shoots. Another method is to dig them out of their hiding places near the roots of the infested plant in the daytime, as they retreat with the appearance of daylight just below the surface of the ground.

If in sufficient numbers to warrant, spray the vine with a solution of Paris green (which must be agitated continuously while using to prevent settling), one pound to one hundred and fifty gallons of water. This will not harm the fruit or plant, even though the grapes have attained half the size of a pea. If it is feared that live stock may get to the foliage, and thereby become poisoned, apply the same solution to cabbage leaves, which, if placed near the troubled vines, will attract the attention of cut worms and destroy them. Afterwards these cabbage leaves may be picked up and destroyed, or left to wither without danger.

To apply the Paris green solution, use any good spray pump; or even a syringe will answer for operations on a small scale.

SPHYNX MOTH, OR ARMY WORM,

As sometimes improperly called: Spray with Paris green as above, using one pound to one hundred and fifty gallons of water. Treat particularly well the outside rows of the vineyard, and they will never get farther than these. If only a few worms infest the vines, they may be hunted on the foliage and destroyed by hand.

GRASSHOPPERS.

This plague has been successfully met by the use of arsenic and bran remedy, prepared as follows:

Forty pounds bran, fifteen pounds middlings, two gallons cheap syrup, twenty pounds arsenic, mixed soft with water; a tablespoonful thrown by the side of each vine or tree. Cost, per acre: for trees, 25 cents; for vines, 50 cents.

If placed on shingles about the vineyards, much of the poison may be afterwards gathered up and saved.

Complete success has resulted from the use of this remedy, as the grasshoppers eat it greedily and die in their tracks.

For this may be substituted with equal effect the Paris green spray, applied as for cut worms.

THRIPS

Are best trapped by means of two semi-cylinders framed with band iron and covered with window gauze; these hinged together on one side should be provided each with a semi-circle pan for a bottom, so arranged that the whole may be closed about the vine. Rub the gauze over with a rag saturated with coal oil and place a little also in the pan at the bottom; then when the whole is closed about the plant, kick the stump of the vine or disturb the foliage by introducing the hand or a stick from the top, and the insects fly to the gauze, where contact with the coal oil destroys them. For full particulars regarding the construction and method of operating this trap, see second appendix to Report of Chief Executive Officer for 1888.

Thrips cannot be poisoned on the vine, as they subsist on the sap alone, which is sucked from the leaves, thus causing them to wither and dry up.

THE FLEA BEETLE

And others of this class which consume the foliage of the plant, giving to the leaves a riddled appearance, may be trapped also with the above named contrivance, for commonly any slight disturbance causes them to drop to the ground, where they secrete themselves.

A better method, however, where circumstances will permit, is to spray the vines with the Paris green solution described above.

THE FALSE CINCH BUG

Is of a grayish brown color with pupa of about the same color. Both are, when full grown, about one eighth of an inch in length. They appear occasionally in spots in the vineyard, infesting such vines in great numbers and consuming the leaves. They fall to the ground when the vine is disturbed, where they are scarcely visible. They have caused our vineyardists no serious damage, as they disappear after a short season, and have not at any time in the past become general. They may be easily caught with the gauze trap and kerosene, or may be poisoned by the Paris green spray.

HARES, RABBITS, AND SQUIRRELS

Have been a constant menace to young plantations made in new districts. A tight fence affords the most perfect immunity from their attacks. Squirrels may be kept out by making a tight fence along the side of their approach. They will not travel far to go around this, unless the place is very much isolated, because of their fear of dogs, hawks, and other natural enemies.

Hares which come a long way to devour the vines will be noticed to confine their attacks to a few vines at different places in the vineyard,

which they eat down as regularly as the new growth appears. A weak solution of asafœtida prepared by dissolving in alcohol and then adding water, has been applied to the afflicted vines with good success.

These animals will also be destroyed by the Paris green solution if applied frequently during the early growing season.

VEGETABLE PARASITES (OIDIUM OR POWDERY MILDEW)

May be best prevented or removed by using sulphur, which should be applied, first, when the vine is in full bloom, being careful to dust or blow it well over the flowers. Repeat the dose about the middle of June, and later again, if any sign of the disease appears.

If for table grapes, the sulphuring may be continued monthly until they begin to change color. Sulphuring should, however, never be done to wine grapes after the berry has attained two thirds its full growth, as by so doing it reaches the wine and gives it a bad odor.

Let it be remembered that the disease begins its development where the average of day and night runs up to 52 degrees Fahrenheit; it spreads rapidly at 70 degrees Fahrenheit, and is checked in its growth where the thermometer indicates near 100 degrees Fahrenheit. Above 100 degrees its damage is rapidly diminished, and at 112 degrees—a temperature quite common throughout the interior vineyard districts of California—the germs lose their vitality and the effects of the disease entirely cease.

The sulphur used may be either finely ground or sublimed; the former is most commonly employed, as it is cheaper and answers the purpose equally well. It should be applied so as to lodge as much as possible on and near the growing parts of the vine. This secures a dense sulphur vapor in direct contact with the diseased organs. Sulphur on the old stump, or even on the surface of the ground, will destroy the oidium, but a larger quantity would be required.

COULURE,

Though not itself a direct disease, results from other evils. It is, in a measure, prevented by sulphuring at the time of blossoming, when oidium, which would otherwise interfere with the fertilization of the the flower, is removed. This is not always a cure, however, as other causes exist for the evil, principally sudden changes in weather, either hot and dry or cool.

The most successful treatment for the trouble when so occasioned results in *pincage*, the process of pinching off the ends of the fruit-bearing shoots when flowering begins. Also, the annular incision may be adopted, which consists in ringing out with an appropriate tool a band on the outer bark of the fruit-bearing cane or shoot just *below* the point where the bunch stem joins the shoot. Nipping off the end of the long bunches will also aid in keeping the remaining fruit on, and cause it to ripen large and full.

The foregoing disposes of those enemies most common to our vineyards in the past, with the exception of the phylloxera, which, though most formidable of all, has been discoursed on at sufficient length before.

J. H. WHEELER,
Chief Executive-Viticultural Officer.

GRAFTING TO MUSCATS.

The following circular and questions explain the objects of this publication:

STATE OF CALIFORNIA, BOARD OF STATE VITICULTURAL COMMISSIONERS,
OFFICE OF THE CHIEF EXECUTIVE VITICULTURAL OFFICER,
SAN FRANCISCO, August 15, 1888.

DEAR SIR: During the next spring many grape growers, who have in the past cultivated grapes for wine making, will graft their vines onto Muscats for raisin-making purposes. From those who will make this change there have come to me numerous inquirers as to the suitability of ordinary varieties for such grafting.

The experiences of the past on the subject are somewhat conflicting, but, knowing there have been trials enough already made with this grafting to determine its value, if the results were but known, I am endeavoring to collect them for the instruction of the public.

Believing you may be able to assist me with your knowledge or experience, I have taken the liberty of addressing to you the following questions, which you will please answer by mail, at your earliest convenience.

If unable to answer these questions from your own experience, will you kindly note, under the head of "Remarks," whatever information you may have received from others regarding the success of grafting Muscats onto other stocks.

Very respectfully,

J. H. WHEELER,
Chief Executive Viticultural Officer.

The questions were as follows:

1. Have you ever grafted Muscats on the roots of other varieties; and if so, what were the other varieties?
2. When was your grafting done—what year and month?
3. About what percentage of the scions grew?
4. Do they now appear as healthy as do Muscats on their own roots?
5. Does the fruit set well and ripen equal to that of Muscats on their own roots?
6. Would your experience lead you to advise others to employ this method in preference to pulling up the old vines to plant Muscat cuttings?
7. Remarks.

ANSWERS.

A considerable number of the vine growers addressed were unable to report any experience; many, however, were kind enough to write me their opinions, for which I desire to publicly express thanks.

I have selected from the many letters received the following, which have been condensed as much as seems consistent with clear expression. To indicate the questions above given, their numbers are employed:

J. Knauth, Sacramento.—7. Would prefer grafting on most any kind of robust grower if Muscats are desired.

H. G. Ellsworth, Niles.—1. Various. 2. Varying throughout twenty years past. 3. Good results generally, but followed by knotty accretions on roots. 4. A small per cent. 5. Think it is not so good. 6. Would not graft old stock; would graft stock one, two, or three years old.

J. C. Merithew, Cupertino.—1. Grafted one hundred Muscats onto Trousseau. 2. March, 1880. 3. 99 per cent. 4. In good order. 5. The same. 6. I would advise grafting.

W. E. Cole, Brooks, Yolo County.—1. Grafted three hundred Mission onto Muscats. 2. 1878. 3. 85 per cent. 4. Produce better wood than Muscat roots. 5. They are the heaviest bearing Muscats I have ever seen. 6. Yes. 7. The Mission is preferred for this grafting, because it best stands the summer heat, and is a strong grower.

John T. Doyle, Cupertino.—1. Grafted on Charbono. 2. March, 1888. 3. 99 per cent. 4. They look perfectly well. 5. Cannot yet determine. 6. I should graft by all means. 7. I think you can graft any one sort on another, and if the work is well done your grafts will grow perfectly.

J. A. Brun, Oakville.—1. No; we never have, but we have grafted other varieties on Muscats which did not prove a desired success. Would advise grafting Muscats onto other stocks.

W. A. Sanders, Sanders, Fresno County.—1. Yes. 2. February. 3. 90 per cent. 4. Yes. 5. Yes. 6. Yes. 7. Grafted three thousand vines, part to White Corinth.

Wm. M. Johnston, Anderson.—1. Yes, onto Mission, Feher Szagos, and a nameless seedling. 2. March 1, 1881. 3. 90 per cent. 4. No. 5. No. 6. No. 7. Vines made feeble growth after first year, small bunches, much inclined to coulure and sunburn; old stumps decay and become unhealthy. Grafts strike roots.

E. W. Maslin, Sacramento.—1. Grafted ten Muscats on Vitis Californica roots two years old. 2. April, 1887. 3. 80 per cent. 4. Unable to judge from experience. 5. Not yet old enough. 6. I should certainly graft. 7. The union is perfect—grafted *at* surface and hilled soil about it. I prefer this to deep grafting; as, if graft fails, we have still the old vine.

R. C. Kells, Yuba City.—1. Yes, onto Mission, Riesling, Hamburg, Rose of Peru, and others. 2. March and April, 1887, 1888. 3. 90 per cent in 1887; 75 to 80 per cent in 1888. 4. They do on the Mission root. 5. Yes, on the Mission but not on others. 6. Yes; but on Mission only. 7. Have grafted Seedless Sultana and Zante currants on Mission and they do well. Mission does not sucker as do the others.

Robert Barton, Fresno.—We have never grafted Muscats on other roots, but have noted it done in this section to considerable extent and apparently with success. Colonel Forsythe has grafted on Zinfandel. J. W. Pew on Sultana. Growth of the grafts seems to be first class.

F. D. Rosendahl, Kingsburg.—1. Have grafted Muscats onto Zinfandel. 2. February and March, 1886, 1887, 1888. 3. All grow when the work is well done. 4. Better and stronger than on their own roots. 5. The first year only a few bunches, but full crop next year, and fully as good as on its own root. 6. "Don't pull up the old vines, but have them grafted if you want a good vineyard."

Capt. J. Ch de St. Hubert, Fresno.—1. Upon Tokay and Malvoisie. 2. January, 1883. 3. A fair average grew. 6. No.

G. W. Linderman, Madison.—1. Yes; on Mission. 4. They do better than when grown on their own stalk; berries good size and bunches large. To raise Muscats, would plant Mission roots and graft to Muscats.

B. R. Woodworth, Fresno.—1. Have grafted Muscats onto Feher Szagos. 2. March and April, 1887. 3. 40 per cent. 4. Apparently so. 5. Fruit ripens later. This year had considerable crop; some of it will not mature. 6. If old, would tear them out and plant Muscat roots in preference to suckering grafts, etc.

Thomas Rose (for A. M. Witham), Woodland.—Grafted one hundred Zinfandel over onto Muscats in 1887. Ninety-eight grew, and this year yielded ten pounds of grapes per vine.

C. A. Crosby, Riverside.—1. Yes; onto Mission and Rose of Peru—twenty-five vines. 2. January, 1886. 3. All grew. 6. No.

J. F. Winsell, Balls Ferry.—1. Yes; on Flame Tokay and Mission roots. 2. March, 1884. 3. 50 per cent; attribute great loss to my grafting too late, as sap drowned the graft. 4. They do. 5. Alongside of others from cuttings, I can observe no difference. 6. I certainly should; it is less trouble to graft, and they bear the second year. 7. A friend grafted Missions to Muscats fifteen years ago, and they still bear fine grapes.

——, Escondido.—1. Grafted onto Mission, Rose of Peru, Black Hamburg, Zinfandel, and Carignane. 2. February, March, April, 1885, 1886, 1887. 3. In 1886, 85 per cent on two thousand four hundred Zinfandels; in 1886, 60 per cent on six hundred Hamburgs; in 1886, 90 per cent on five hundred Rose of Peru; in 1887, 60 per cent on five thousand Carignane, grafted in March and April. 4. Yes; on the Hamburg and Rose Peru — not so well on Carignane and Zinfandel. The thriftiest growth was on the Rose of Peru. 5. Better on the Hamburg and Rose of Peru—about same on Carignane, but not so well on Zinfandel. 6. Much better to graft unless stock is too young; even then it is all right on vigorous varieties.

Dr. W. S. Manlove, Perkins, Sacramento County.—1. Grafted Muscats on Mission and Feher Szagos. 2. March, 1873, 1878, 1884, and 1888. 3. 98 per cent. 4. On the Mission they do not; on the Feher Szagos they do. 5. It does not on the Mission. 6. No. 7. Would not graft white varieties on purple stock. Fifteen years ago grafted Tokay onto Dutch Sweetwater; they grew and bore well, but never colored as it does on its own stock, or when grafted on purple varieties.

W. H. Wells, Dixon.—1. Grafted three thousand onto Mission roots, which were ten or twelve years old. 2. March and April, 1873–4–5–6. 3. 75 per cent. Where not successful first time, regrafted until I got a good stand. 4. They are more thrifty, longer canes, and more foliage than Muscats on their own roots. 5. Fruit sets and ripens well, and the grafts yield better crops in every respect than Muscats on their own roots. 6. Graft instead of pulling up; for if well done, the grafts will yield more second year than vines five or six years planted.

Chas. Wilkinson, Etiwanda.—1. Grafted Muscats onto Mission, Tokay, Seedless Sultana, Rose of Peru, Zinfandel, Malaga. 2. March, 1887. 3. 95 per cent. 4. Grow well on all these varieties as strong as on their own roots. 5. Bore three to five pounds per graft this year, clusters large and good as those on five-year old Muscats. 6. Would graft every time. 7. I have planted Peru for express purpose of grafting to Muscats.

H. Dugdale, Etiwanda.—1. Yes; on Mission and Zinfandel. 2. Early in March, 1887. 3. 75 per cent. 4. More healthy. 5. Equally as well. 6. Would advise it, by all means. 7. All wine grapes may be so grafted. To graft successfully, remove the earth deep about the stock; saw off beneath buds or sprouts; split with chisel and mallet; scion six inches long, wedge-shaped, to fit the split when opened; make bark even on outside; wrap with strip-cloth, to keep dirt out, then fill up hole with earth.

C. O. Tucker, Ballena, San Diego County.—1. Grafted onto twenty

other varieties, principally Mission, Black Hamburg, Rose of Peru, G. Chasselas, and Zinfandel. 2. March, 1880; March and April, 1881; April, 1882; May, 1883, and May, 1884. 3. In 1880, on Mission roots, 98 per cent; 1881, on same, 93 per cent; 1882, on a variety of roots, 80 per cent; 1883, same, 76 per cent; 1883, same, 81 per cent; 1884, same, 60 per cent. 4. Ora Mission, Black Hamburg, and Rose of Peru, yes; on other varieties, except Zinfandel, no; on Zinfandel, more healthy, but don't set fruit so well as on their own roots. 5. On Mission and Black Hamburg, fruit sets better than Muscats on their own roots; on Rose of Peru, don't set as well, and suffer from coulure; on Zinfandel, don't set well, but ripen well; on other varieties, no. 6. With Mission, Black Hamburg, Rose of Peru, and Zinfandel, yes; other varieties I have tried, no. 7. Prefer common cleft graft, eight inches deep on old stocks; two or three inches on young stocks. I employ with best results a wax—one part beeswax, two parts resin, three parts tallow. Had most failures when I used equal parts of clay and cow-dung. Graft in cloudy weather. For scions, use laterals. Would not graft on Pineau, Chasselas, Riesling, Tokay, or Sauvignon. Employ no man of bilious temperament.

Geo. H. Craft (for others), Redlands.—Grafted miscellaneous varieties to Muscats; results always satisfactory.

G. F. Merriam, Escondido.—1. Have grafted twenty-four vines to Muscats, viz.: Rose of Peru, Black Morocco, Mission, and others. 2. March 20th to April 10, 1883. 3. All. 4. Yes. 5. Yes; so far as I see. 6. Yes. 7. Where I used common cleft graft most of scions grew; but I one year used Dr. Cougar's machine and lost over half. Do not let any one use the machine. Raisin growing in this locality very unsatisfactory.

J. J. Stephens, Madison.—1. Yes; have grafted onto Mission stock. 2. March, 1872. 3. 94 per cent. 4. Yes; more vigorous. 5. A great deal better. 6. Yes; with us Muscats do better on Mission roots than on their own.

John Hall, Riverside.—1. Yes; onto Mission. 2. March and April, 1879 and 1880. 3. 90 per cent. 4. Yes. 5. Yes. 6. For a whole vineyard, would advise planting Muscats; but for occasional Missions or other varieties, would graft.

E. Z. Clanton, Woodland.—1. Yes; onto Mission, Hamburg, and Tokay. 2. December, 1886–7. 3. 99 per cent. 4. They look healthier. 5. Yes. 6. By all means. 7. Have had grafts bear the first year; they bear well the second year. Have had difficulty in getting cuttings to grow where old vines were pulled up; lost 50 per cent.

J. M. Asbell, Millville, Shasta County.—1. Have grafted Muscats onto Mission roots three and four years old. 2. 1869 and 1870. 3. 90 per cent. 4. About the same. 5. They set fruit well, and ripen fruits equal to Muscats on their own roots. 6. Would advise grafting, as it loses no more time than one year.

George W. Applegate, Applegate.—1. Grafted onto Mission roots. 2. March, 1880. 3. Used cleft graft, and scarcely scored a miss, using two scions to the vine. 4. Yes. 5. Yes. 6. Yes, you secure by grafting an enormous growth the first year, and the second year a crop of fruit; the only difficulty is that of suckering. 7. Used cleft graft, two scions to each subject, spreading the vine with a wedge to insert the scions; used clay as a mastic. Would graft any kind rather than pull them up, as they bear grapes the first year.

H. Goepper (for his neighbors), Santa Ana.—1. Grafted onto Mis-

sions. 2. At different periods, but with best success at time buds were about to open. 3. 80 per cent. 6. It would.

A. J. F. Whitthouse, Fresno.—1. Yes, onto Zinfandels. 2. Latter part of March, 1887 and 1888. 3. 75 per cent in 1887. 40 per cent in 1888. 4. Yes. 5. Yes. 6. Yes. 7. If grafting in alkali lands, would cover union with grafting wax, as I found many stumps rotten and scions dead.

C. K. Kirby, Fowler Station.—1. Yes, onto Trousseau. 2. March, 1888. 3. 90 per cent. 4. They do. 5. Not yet crop enough to tell.

Charles McLaughlin (per Kirby), Fowler.—1. Grafted onto Mission, Feher Szagos, Zinfandel, and S. Sultanas. 2. 1887. Find Zinfandel and Feher Szagos best stock to graft on, and Muscats do better on Mission and S. Sultana than they do on their own roots. If desiring a Muscat vineyard, would plant strong growing roots and graft Muscats onto them. Other experiences in this section confirm the above.

C. O. Rust, Anaheim.—1. Grafted onto one hundred Zinfandels. 2. March, 1882. 3. 80 to 90 per cent. 4. Yes. 5. Yes. 6. Would advise grafting in preference to pulling up, provided the vines are not too old, and in good shape.

C. M. Silva & Son, Newcastle.—1. Yes; principally on a Mission. 2. March, year forgotten. 3. 95 per cent. 4. Yes, if not better; growth is stronger, but soil may be better. 5. Yes. 6. Yes; if old stocks were perfectly healthy. 7. Grafted by digging down three or four inches below the surface of the ground, sawing stock square off, split it down with a chisel, cut the graft wedge-shaped; inserted one in small, two in old stocks; brought the soil up around them, pressing it carefully around the graft, allowing one bud of the scion exposed; greatest loss was by knocking out in cultivating.

H. C. Morrell, Wrights.—1. Yes; onto Feher Szagos, Miller's Burgundy, Franken, and Gray Riesling. 2. February, 1875. 3. 95 per cent. 4. Much more so. 5. Much better; do not coulure like Muscats on their own roots. 6. Would graft on any strong grower, but not on Burgundy or Riesling, as the vine takes the habit of the old root, and the berries are then small, tough, and unfit for market.

D. C. Feely, Alma.—1. On Mission, Black Hamburg, and Catawba. 2. March, 1870 and 1877. 3. 95 per cent. 4. Yes. 5. Can notice no difference in respect to the fruit. 6. If stocks are healthy, would graft in preference to digging up. 7. I cut my scions early in January; then I dig a shallow trench on the north side of a building or fence, and lay my cuttings in and cover with soil to the depth of two or three inches. I sometimes cover them over with boards, to prevent the rains of winter from rotting them. A good way would be to put the scions in a cellar and cover with sand. The buds should be kept in a dormant state until the grafting is done. The best time to graft is when a flow of sap is moving to swell the buds and bring forth the leaf on the vines in the early spring. This may occur earlier in some localities than in others; but, as a rule, March is the best time to do the work.

N. D. Harwood (by C. A. McDougall), Escondido.—1. Yes; on Mission, Hamburg, Rose of Peru, Tokay, and some others. 2. February, 1880–1–2. 3. 95 per cent. 4. Yes. 5. The size and quality of fruit is improved. 6. If roots are healthy, by all means graft them and secure fruit from the start. Have tried grafting by cutting into side of the stump with a chisel, but the grafts fare like the "titman pig."

B. P. Mackoon, El Cajon.—1. Yes; Mission, Zinfandel, Blanc Elbe, Verdal, Sweetwater—first three, chiefly. 2. February and March, 1885–6–7–8. 3. 90 per cent; when great care was used, all grew. 4. Yes; many of the strongest vines in the vineyard are those grafted on other roots. 5. Fruit sets equally well; the first and second year of bearing, the fruit ripens a little later. 6. "A thousand times, yes."

Estate Geo. A. Cowles, by B. P. Mackoon, Superintendent.—The experience on my own place answers for this, as confirmed by the foreman, who was on the Cowles place when the grafting was done. When the graft did not grow, or where injured by accident, we have dug a little lower and cut off and grafted the old stock anew the next year, with just as good results as in first grafting.

A. F. Anderson, Blacks Station, Yolo County.—1. Yes; onto Mission. 2. When buds are swelling, and just before they put forth, in 1873–4–5. 3. 90 per cent. 4. I think they do. 5. Fully as well. 6. Would graft, as fruit comes two or three years sooner.

———, Anaheim.—1. Have grafted Muscats onto several varieties, with best results on Mission roots. 2. Last of February and fore part of March. 3. 98 per cent. 5. The fruits set fully as well as Muscats on their own roots. 6. Would not graft again.

T. F. Miller (for a neighbor), El Cajon.—1. The general appearance of the grafts the first year was good, and they appear as healthy as Muscats on their own roots. I would graft in preference to pulling up old roots.

Wm. C. Walsh, Escondido.—1. Onto Mission and Rupestris. 2. March, 1886. 3. 100 per cent. 4. Yes. 5. Equally as well. 6. Would graft in order to secure a large grape and large bunch. 7. Have had twenty years' experience in this work. I put two scions in a stock of one inch or more in diameter, which is split with a chisel or sharp hatchet. I cross scions on the liber or inner bark just the least particle, and put a piece of folded paper between the scions on the crown of the stock to keep the soil out, and if both grow, destroy the weaker scion.

J. H. Harlan, Woodland.—1. Mission. 2. March, 1887. 3. 80 per cent (grafting done by inexperienced hands). 4. Yes; and far better. 5. Yes. 6. Yes; would graft on any strong grower to secure fruit sooner and a better stock.

H. Davenhill, Fresno.—1. Have grafted Muscats onto Malagas, Feher Szagos, Mission, and Rose of Peru. 2. March (early), 1887. 3. 75 per cent. 4. Yes; the most of them. 5. Fruit sets well, bunches good, and ripens equal to Muscats on their own roots. 6. Decidedly so; without any doubt. 7. The year I grafted I gathered fruit, very fine bunches—mostly second crop. This year I gathered about twenty-five pounds from each vine—first crop.

Levi Chase, San Diego.—1. My foreman grafted Muscats on white wine grapes—name unknown. 2. March, 1888. 3. 90 per cent. 4. They appear perfectly healthy and made, this summer, an extraordinary growth. 5. But few small bunches set on them this season. 6. I think it a success and shall graft more next spring. 7. The old stocks are cut off below ground and a hole bored into it with a bit; the graft is then fitted snugly into it and covered with earth, except one bud.

CONCLUSIONS.

From the above, it may be safely inferred that with the exercise of proper care in the operations of grafting the Muscat forms no exception to the general rule, viz.: that the placing of any variety on a stronger root than its own will produce better results than will the same variety on its own root.

Of the total number of experiences reported above, forty-eight in all, we find but five where the writer unqualifiedly would not advise grafting other varieties to Muscats in preference to pulling up the old roots and planting anew. Four would advise grafting only under certain favorable conditions. While many of the large majority who advocate the method, speak enthusiastically of their success. I should venture the opinion that, if those who might object to grafting instead of replanting were called upon to make cuttings or even roots grow in land which had been drawn upon for many years by old vines, they would find the undertaking far more serious than they might at first suppose. Let no person believe that the young vines will grow in the exhausted soil of an old vineyard as they would in new ground.

Many vineyardists advocate the planting of such strong growers as the Rose of Peru for the express purpose of grafting to Muscats, and this, too, after many years of experience in the matter. Few would wish to graft such varieties as Rieslings, Pinots, or Burgundies, so that the objection to them as weak stocks need not be dwelt upon. The Mission and table grapes form the favored stocks, and have afforded us the greatest number of examples, though the Zinfandel has also proved satisfactory.

The conclusions shown in the above answers need no comment as to the general result. They prove plainly that *those who contemplate the grafting of Muscats onto wine or table grapes are by wide experience safe in the undertaking.*

Incident to the results here named, there has appeared with these reports other important information, seen under the seventh head—"Remarks."

Grafting by machine has proved unreliable, and growers are warned against their use, notwithstanding they may, on certain occasions, have proved satisfactory when operated by their inventor. L. Chase, of San Diego, describes a method which has before been unsuccessfully employed by others, and which in the hands of his foreman has succeeded admirably; but I should caution others about adopting these novelties for work on a large scale, as a long and dear experience has proved that for general utility the wedge graft is surest and best.

Several of my correspondents have favored me with particulars as to the methods employed in their work; several of these I have given in full, particularly if their results proved favorable, thereby confirming their methods. For instance, see reports of Wm. C. Walsh and H. Davenhill.

Many dispute the value of applying any mastic or wax to the point of union. My own experience leads me to conclude that it is wholly unnecessary. Many successes are recorded where not even clay has been used, simply piling up the loose dirt about the graft. If, however, anything is to be employed, clay is the best.

It may be concluded that it is safest to tie in the graft. For this

purpose strips torn out of cheap cotton cloth, or raphia, which is sold by some of our seedmen, answers the purpose. Some of the above writers lament their loss by knocking the grafts out in cultivating, etc., and by examining their work we find that they have failed to tie in the scions.

Too much emphasis cannot be given to the value of properly caring for the wood to be used for scions, which should be cuttings, or, better still, whole canes, as pruned from the vine. From these the operator may, in the spring, cut scions large or small, long or short—wasting no buds. These should be imbedded, when taken from the vine, on the north side of some building, in trenches covered well with earth. For this purpose they may be tied into bundles or left loose. Do not be afraid that they will rot. A little mold on them will prove no injury. Where, for any cause, the grafts fail to grow the first year, experience indicates that the same subjects may be grafted again the following August, using for scions cuttings which have been heeled in. Or, the following spring, we may regraft this with the same chance of success as was had at first grafting.

If you wish to secure the full advantage of the strong plant onto which the Muscat is to be grafted, care should be taken to remove all roots proceeding from the scion.

In concluding this inquiry, let it be understood that this work is not offered as one furnishing complete instructions for grafting; that has already been given to the public in a translation from the French, made by me some years since, entitled "Different Methods of Grafting the Vine," and forming Appendix III to the report of the Chief Executive Officer. This work was copiously illustrated, and copies may yet be had by applying to the Secretary of the Board.

WINES.

THEIR CARE AND TREATMENT IN CELLAR AND STORE, TOGETHER WITH A SHORT TREATISE ON VINIFICATION.

By Raimond Boireau. Translated from the French by E. A. Schneider.

INTRODUCTION.

California wine makers are often heard to give expression to the hope that they may some day visit Bordeaux. They would inspect celebrated cellars and learn the "tricks" by which the merchants of that place attain their famous excellence. Several Californians have visited France for this purpose—returning abundantly provided with grape-growing information, but still deficient in knowledge pertaining to the cellar and store.

The reticence observed among French merchants and manipulators is a trait common to all good merchants, for which fact we may properly withhold our censure. Nor do the French wine merchants come to us to deal out gratuitous information as do foreigners representing many other branches. We find them too zealous in the interest of domestic productions for this; too patriotic to leave home. And, then, a term of apprenticeship in foreign wine houses will not supply one with all that is requisite in this branch; we are obliged to look to their literature for further aid.

The present volume is compiled from a long term of experience in the cellars of Bordeaux and Paris; and, although no book alone can make an efficient cellar master, it is thought the contents of this work, added to the practical experience already possessed by many of our wine makers, will serve to improve those qualities of our goods which render them more marketable.

The theoretical part of wine making has been abundantly developed in California. The need of the present is practical knowledge of finishing operations. Accordingly, this translation contains no chemical formulæ, nor is anything given which the common laborer who reads will fail to comprehend. Boireau's work cannot be called an elementary work. Still it does not imply any theoretical explanation of reasons for the facts stated. The explanations are found in the previous knowledge of practical work and natural, every-day operations familiar to any one working in wines.

This book, it is thought, will assist in determining how to make the most palatable beverage with the materials at hand; how to make our wines attractive and sought after. It describes many of the so called "tricks" which will properly improve our "stock wines," and details fully the best methods of guarding against their deterioration and loss.

It is evident from recent experience that greater care is needed in maturing and aging California wines. We have had the "age of grape growing," and the present may be properly styled the "age of merchants." These merchants, whether evolved from the grape growers or

originating as such, must see that our wines are better nursed for the first eighteen months. They must be watched, as the French aptly term it, "jus like ze little baby." Much wine is spoiled in making, but more of it suffers defect after it leaves the fermenting vat.

This appendix will be found to be a strict translation; and, relating more or less as it does to a technical subject, may not be as smooth reading as if it had originated in the English language. With this in mind the reader will forgive any defects found in expression of the text.

Chapters X, XIV, and XV of the original work have been omitted as being of little value in California. The first provides instructions for dealers and buyers, and is purely local. Chapter XIV relates to processes of distillation—a subject on which I am already engaged in preparing a handbook of instruction, one which will be more comprehensive than the chapter named.

Chapter XV contains the rules, laws, and regulations pertaining to the sale and delivery of vineyard products, and would be of little use here.

Part first is a single chapter from Boireau's Volume I, and as it is the only portion of this volume which relates to the cellar, it is combined here with the second volume. The subject of Part I is akin to that treated in Mr. Rixford's excellent compilation made some years since, and will, with that work, I think, adequately cover the ground.

Dr. Bleasdale's little translation on "The Vinification of Claret" should, in addition to Rixford's "Wine Press and Cellar," be in the hands of every wine maker. These will serve to perfect all operations preliminary to the subject of this appendix, and with the latter will form a fair beginning in the œnological literature of California.

Many of the instructions only casually stated in the following pages we discover to be those occasionally whispered about as secrets of great value known only to a few. Men among us have professed to be "wine doctors" (more aptly applied here than the term œnologists), with less than half the knowledge recorded in chapters ten and twelve. Among other novelties, the first chapter teaches the best mode of keeping wine sound for ulling purposes; close and moist cellars, it is stated, are needed to guard against sherry flavors and the taste of rancio—and the whole shows that far more regard for cleanliness must be had than is noticeable in many California cellars.

When told in the second chapter that, in racking, the bung-starter must not be used for fear of raising the lees, we are lead to believe that truly wine must be like "ze little babie," and that some modification of our rough and careless treatment must be had. The work on clarifying will be found a valuable addition to our literature, and will be useful to even the best informed. So on throughout the book, the cellar-master will encounter many surprises. In the illustrations, simple devices are furnished for diminishing labor and insuring improved results.

The chapter on aging wines could be advantageously improved by a description of Dr. Frazer's process of aging wines by electro-magnetism. A process not only producing good results in practice in California, but one receiving distinguished praise and recognition abroad, as attested by the conference recently reported at Dijon, where distinguished jurors pronounced strongly in its favor.

Pasteurizing has received a new impetus with the improvements made in apparatus, and this process is now a common resort among French

wine merchants. In the recent additions made to Mr. J. Gallego's cellars, at Irvington, may be seen an apparatus of the most finished nature—one particularly approved by the eminent expounder of the process called after him. An examination of this machine will convince the reader that more importance is now attached to the process than is accredited in Chapter X of this work.

No doubt some will find other parts of Boireau's work which appear somewhat antiquated or at trifling variance with the experience of the present day, or that belonging to California; but there is still enough of instruction left to make the study of the complete work well worth our while.

"Americans," it is often said, "do not take kindly to wine." This is because they begin with the cheap wines, which have received careless treatment and thereby lost their greatest charm. The mellowness, the pleasant aromas, and delicate sweetness have disappeared, replaced by hard acids, bitter newness, or excessive astringency. It is only another proof of their good taste that our people do not readily become customers for such goods.

Our numerous Conventions and sampling tests, together with the entertainment of eastern visitors on frequent occasions, affirm the conclusion that *Americans do like good wine and will drink the best and pay well for it* when they know where to find it.

The reasons why wine has not become an American beverage are many and apparent. If Americans had ever once become habitual wine drinkers, like many of the people who come to us from foreign shores, then, perhaps, not even harsh, sour, or poor wines would serve to alienate them from their desire for it. We might be able to dump into the market everything we could make, or as some one has jocosely remarked, "even wine made from grapes." But to successfully inaugurate the custom of drinking light wines proper for every day use, to make the benefits we claim for it common to all, we must have wines which *taste good* to all.

We find our eastern visitors and lady friends like sweet wines—principally for the sugar contained—to drink which they are made uncomfortable by the spirits commonly accompanying such wines. This, we must remember, too, causes wine drinking to be stigmatized as intemperate, and relegates the liquid to the category of stimulants, instead of classing it with health-giving beverages for daily use.

Give them the best mild light wines our California vineyards are capable of producing, treated as detailed in this book, as a substitute for the truly intemperate "sweet Catawba," common to the East but unknown here, and wine will cease to be a luxury, becoming a necessity, and a marked revolution will grow up in the opposition ranks. The arguments commonly urged by eastern prohibitionists emanate from the use of fortified wines, which they attempt to drink as we drink the lighter beverages. These arguments must be turned in our favor, and prove our earnest endeavors to be in behalf of true temperance.

But the proof of the pudding is truly in the eating thereof, and to insure the drinking of our wines they must be made tempting and wholesome. It is to the aid of the California wine merchants, in their endeavors to secure this end, that this translation is humbly inscribed.

JOHN H. WHEELER,
Chief Executive Viticultural and Health Officer.

PART I.—VINIFICATION OF WINES OF THE GIRONDE, AND OF ALL ORDINARY WINES.

CHAPTER I.

GENERAL REMARKS—DIFFERENCE IN THE PRICE BETWEEN THE FINE AND THE ORDINARY WINES.

General remarks.—Difference in the price of the fine and of the ordinary wines. Preliminary measures to the vinification of red wines. Vinification of high-grade wines of the Gironde. Varieties producing high grade wines. Nature of the soil and varieties suited to the production of fine wines. Vintage, stemming, foulage, fermenting tanks. Drawing off the murk. Vinification of the white wines. Vinification of the high quality white wines of the Gironde. Varieties. Varieties of a lower class. Picking the grapes; fermenting. How to augment the destiny of the must.

The fermentation has a decisive influence on the quality of the wine, according to the favorable or unfavorable conditions under which it was effected. The phenomena of the vinous fermentation have been the subject of serious study and observation by a great number of chemists and of physicists. In the beginning of this century a celebrated scientist, Count Chaptal, wrote a book on "The Art of Making Wine." Since the appearance of this work, a great number of books on wine making and on viticulture have been issued, but they offer to the viticulturist, as far as the practical vinous fermentation is concerned, but very few ideas which have not been hinted at by the illustrious author of "The Art of Making Wine."

Long ago, even before the publication of the work of Count Chaptal, the majority of the producers of fine wines in the Gironde applied to the fermentation of grape juice all of the improvements which are taught by œnology, a science whose objects are the vinification and the treatment of wines. The proprietors of inferior vineyards act very differently. It is painful to see how this class of people are neglecting the precautions which vinification requires. Good advice, however, has been given them often enough. Nevertheless, every year a great quantity of wine is made, which has already, on leaving the fermenting tanks, the germs of acidity in it; and the warmer the weather has been, and consequently favorable to the maturing of the grapes, the more frequently this defect is met with, a defect which has often no other cause than the neglect of the wine makers to prevent the access of air to the caps in the fermenting tank, and to draw off the murk at the right time.

The considerable difference which exists between the prices of the finest wines of the Gironde and those which are made from inferior varieties can be explained partly by the endeavors of the proprietors of first class varieties to improve their wines by all possible means, while the majority of those who possess ordinary varieties are only after the quantity of their output.

The proportion of the prices is on the average as one to ten. Thus, while the ordinary wines realize 300 francs per barrel, it not unfrequently occurs that 3,000 francs are paid for the same quantity of a wine of the highest quality, and sometimes much more. It is not possible, however, to give exact figures concerning this subject, because the average price of the ordinary wines is fluctuating every year, according

to the abundance of the grape crop; on the other side, the prices of the fine wines are varying according to their excellence. It is not uncommon that the price of superior wines is ten times higher than that of ordinary wines in exceptionally good years; while in bad years, if the wines are tart and poor in body, their price is hardly more than double that of the ordinary wines.

It is, therefore, the direct interest of the producers of fine varieties to obtain perfect wines, in order to sell them at higher prices, while the producers of inferior wines are only anxious about the quantity. These latter calculate in the following manner: If we should stock our vineyards with fine varieties, we would have one fourth or one fifth less yield than from our varieties, which are ordinary ones, and the higher value of our wines would not cover the loss which we would undergo.

If the output of wines had not been diminished by the diseases of the vine, and if the price of the ordinary wines had remained on a lower level, there would be in the trade a demand only for wines which are able to improve on aging. Under such conditions it would be the direct interest of the wine maker to produce better wines in order to obtain a good market and higher prices; for then the higher value of the wines would be equivalent to the value of a more abundant output.

The inferior wines, though they may have been grown on good soil and in favorable sites, owe their inferiority but to poor varieties and to insufficient precaution during their vinification. But what can be the reason of this negligence of the wine makers? It can be attributed but to carelessness, because it is possible to improve the wine, beginning with the first year, without expense, simply by perfecting the processes of vinification and by selecting the proper varieties; thus we may obtain within a few years high-prized wines, instead of poor, ordinary wines.

We are going to speak in detail in the following pages of the various methods of vinification which are used in the Gironde and in the adjacent provinces. These methods can be reduced to two principal types: the vinification of the fine wines, which involve the practical application of improvements indicated by vinology; and the ordinary methods with their faulty customs and manipulations, which should be avoided. It is our intention to describe here only the *practical making of wine from grapes*, without the use of substances foreign to the juice of the grape. We reckon among the artificial wines those in whose preparation sugar, glucose, cream of tartar, water, tartaric acid, etc., have entered; we condemn the use of these substances in the production of fine wines.

MEASURES PRELIMINARY TO THE NORMAL VINIFICATION OF RED WINES—METHODS WHICH ARE USED IN THE VINIFICATION OF THE HIGH-GRADE WINES OF THE GIRONDE.

The finesse and taste of the high-grade wines of the Gironde is founded on the totality of the labor and attention which have been devoted to the wines, to the gathering of the grapes, to the vinification, and to the choice of good varieties as well as to the nature of the soil. The proprietor of a large vineyard can correct the imperfections and natural defects of his wine by blending the varieties intelligently. It is known that a wine is perfect if, after having reached its maturity—or, to use another expression, when it is bottle-ripe—it joins to a brilliant color a full body without

being dry, an aromatic, agreeable flavor and bouquet, and if it is mellow, and has preserved a decided fruity taste.

A wine is defective, even if it possesses fineness, if it is not supplied sufficiently with color and with body enough to keep a long time, if it lacks in flavor and bouquet, or if it is dry, harsh, and without fruity taste, etc. Most of these defects can be corrected, in case the soil is good, by using *the varieties which yield an excess of the quality which the wines that were made from the poor varieties have been lacking.*

VARIETIES PRODUCING HIGH-GRADE WINES.

The best red wine varieties which are cultivated in the Gironde are, according to their merit: (1) The *Carmenet*, or *Petite Vidure*, which is called in the Medoc *Cabernet-Sauvignon, Petite Vidure Firsée;* (2) *Gros Cabernet*,* of which there exists several varieties, often confounded with the *Carmenére*—many grape growers call these varieties *Grosse Vidure;* (3) the *Petit Verdot;* (4) *Gros Verdot;* (5) the *Malbec*, which is also called *Mauzac* and *Noir de Pressac*, and (6) the *Merleau.*

In second line stand the *Cruchinet*, the *Massontet*, and the *Tarney*, which also yield good wines, but only when blended with the preceding varieties. The *Carmenets* or *Petite*, and *Grosse Vidure*, which are called in the Medoc *Cabernet-Sauvignon, Gros Cabernet*, as well as *Carmenére*, appear to be as their names indicate, three varieties of the same species. The *Carmenets* produce grapes and berries of medium size, which ripen at the same time as the majority of the other varieties; they yield a fine wine, which is highly flavored, and has a strong bouquet; the color is not deep; it undergoes changes in contact with the air less readily than wines which are made from other varieties.

The *Carmenére* has larger berries and yields an oily wine, which is deeper colored than that which is made from the *Carmenet*. In other respects, it shows the same qualities. These excellent varieties are the groundwork for the majority of the high-grade wines; several wine makers do not have any others in their vineyards, for they alone yield perfect wines.

The *Petit Verdot* and the *Gros Verdot* are two varieties of the same species. The *Petit Verdot* produces loose bunches with small berries; it ripens rather late; it is the latest of the varieties of the Gironde. In years when the *Verdot* ripens completely, the wine which is made from it has, besides a fine color, much body, much alcohol, and a fruity taste. The oily, mellow taste, which this wine from pure *Verdot* possesses, does not disappear with time—a rare quality, which is difficult to obtain, and which places it in the first rank; it shows also some harshness, which is due to the great quantity of tannin it contains, and which separates out in aging. The wines which are made from this variety improve slowly; they acquire gradually flavor and bouquet, and are the ones which keep the longest time, which stand long voyages better than any other wines, and which change the least in contact with the air. The *Gros Verdot* produces bunches with larger berries, which are also slow in ripening. The wine made from this variety keeps a long time, and has some of the good qualities of the *Petit Verdot.*

The *Malbec*, which is also called *Mauzac Noir de Pressac*, is a black grape and an early ripener; the wine possesses an agreeable flavor, the

* Known in California as Cabernet Franc.

carmeners + merlot or
Verdots 1 . .

color is deep, the taste mellow and fruity, but destitute of vigor; it is, therefore, not easy to preserve the wine in a good condition, particularly if it is stored in a cellar which is subjected to variations of temperature.

The *Merlot*, the *Massontet*, the *Tarney*, are not cultivated for themselves alone, they are often mixed with the two *Vidures*. The *Merlot* yields, if taken separately, a wine which resembles the wine from the *Malbec*. Like the latter, it has a decided fruity taste. The ripening of this variety is sometimes uneven; in rainy years there are frequently found on the same stock ripe and green bunches together. The wine which is made from this variety is agreeable, rather fine, but destitute of vigor and poor in alcohol; it becomes rapidly acid if the necessary precautions to preserve it from contact with the air are not taken. This variety, in order to give good results, should be blended with other varieties which yield a strong, full-bodied wine, such as the *Vidure* and the *Verdot*.

The *Massontet*, the *Cruchinet*, and the *Tarney* are not very common; they occur generally together with the preceding varieties. They yield wines which have partly the same qualities as the wines made from the *Vidure*.

NATURE OF THE SOIL—CHOICE OF VARIETIES WHICH ARE SUITED TO PRODUCE GOOD WINES.

Our object is not to study the nature of soils which are adapted to the culture of the vine. Aside from that, as far as the Gironde is concerned, the vine grows in soils of very diversified character, from arid sand up to the alluvial marshes of the Garonne. We are going to speak here only of the improvement of the wine through the choice of the varieties according to the nature and the position of the soil. The truly practical study has to be made by the vine grower himself—we can give but the outlines and a general idea of it.

Let us first examine the defects of the ordinary wines of the Gironde. The ordinary wines have one, several, and sometimes all the defects which are enumerated below: Low alcohol-percentage, dull, leady color, slow clearing, loss of color after fining, disagreeable earthy taste, taste of stems, bitterness, harshness, roughness, tartness, tendency to become pricked. On aging, these wines lose the fruity taste which some of them could have, and instead of improving, they become harsh and dry, and have no keeping qualities.

We have already said that the excellence of wines was due to the attention and labor which has been bestowed on them—the vinification, the choice of good varieties, the nature of the soil, and the site favorable to the growth of the vine. On the other hand, there are obtained but inferior wines if the opposite conditions prevail—such as the neglect of the necessary precautions during vinification, the choice of the wrong varieties, and the poor nature of the soil.

The varieties which yield ordinary wines are the *Mancin*, the *Teinturier-Alicante*, the *Peloye*, the *Petite*, and the *Grosse Chalosse Noire*, the *Ciontat*, the *Pied de Perdrix*, the *Balonzat*, the *Jurancon*, etc.

Of all the defects of the ordinary wines, the worst are deficiency in alcohol and in body; these defects make it impossible to keep the wines good; and if the deficiency in alcohol is combined with a like deficiency in tannin, they cannot be long preserved from alteration. The cause of this defect should be looked for in the nature of a very fertile soil,

and in the use of varieties which yield an abundance of watery fruit. If these wines have been made from varieties which have grown on strong soils, or on alluvial loams, they can be improved by replacing a part of the varieties which yield grapes that are too poor in sugar by the *Verdot*, which is the variety par excellence of the marshy soils, and which imparts to the wine not only body, color, and strength, but also tannin, which is necessary to its conservation. If the soil is poor and composed of sand or of gravel, and if the site of the vineyard is on well exposed hillsides, the *Vidure* will give good results, particularly if care is taken to choose the best site for it.

The dull and leady color is often due to the lack of a sufficient quantity of tannin and of alcohol to precipitate the mucilaginous substances, the organic albumen, the soluble color, etc., which are in suspension. If more body is imparted to the wine, the clearing and stability of the color are facilitated. As far as the earthy taste is concerned, it depends essentially upon the soil. It is possible, however, to make it partly disappear, because not all varieties have the earthy taste in the same degree, even on the same soil. It has been observed that the wines which are made from the *Verdot* show this taste less prominently than the wines which are made from ordinary varieties, though they may have grown in the same soils. The taste of stems and the tendency to become pricked are due greatly to lack of precautions during vinification.

If a wine contains sufficient body and alcohol to keep a long time, it may at the same time be too rough, too harsh, too bitter; this is the case with certain wines which are grown on hillsides. It is possible to make this wine mellow and to impart to it the fruity taste which it is lacking by replacing a part of the vines by *Malpec* and *Marleau*. In one word, in the production of ordinary wines we should endeavor, if a wine does not contain enough alcohol, to give to it a convenient amount of body by the proper choice of varieties. In order to be able to keep a wine without undergoing changes it should contain about 10 per cent of alcohol; and if the wine contains naturally a sufficient amount of alcohol, but is rough, the endeavor should be made to make it mellow. Such a result can be obtained only with good varieties and by the use of good methods of vinification.

VINTAGE.—Grape growers desirous of making fine wines, which are not tart, should resolve to have their grapes picked only when they are perfectly ripe. It is a well known fact that the different varieties of the Gironde do not mature all at the same time, the conditions of the site and of the soil being the same. Thus the *Malbec*, the *Merlot* ripen earlier than the *Cabernet* (or the *Vidures*), and these again more so than the *Verdot*, etc. Therefore, the necessity arises of gathering the grapes several times. Besides the influence which the difference in the varieties, the age of vines, the locality, and in the nature of the soil exercise, the grapes of the same vine do not all reach at the same time an equal degree of maturity; the grapes which are the most exposed to the sun, those which are next to the stump and which are first reached by the sap, ripen earlier and contain more sugar than the grapes which are distant from the trunk and which are hidden by the leaves, or whose period of bloom was late.

This shows that the same varieties should be picked several times. First, the perfectly ripe grapes should be picked, and the rest should be allowed to mature on the stock. The proprietors of ordinary varieties

make the objection that the picking is more expensive if the grapes are picked from the same varieties at various times; and this is the motive, together with an insufficient supply of vessels for the purposes of vinification, which makes them gather the whole crop of grapes at once. They can avoid the increase of expense, by picking the grapes of each variety when they are completely matured, and then separating them from the green, dried, or rotten and overripe ones; the defective grapes should then be fermented separately and would make a second-class wine.

Complete maturity can be easily recognized by the deep, bluish color of the berries, by the color of the stems, by the softness of the skin, and particularly by the frank, sweet taste, and still easier by the specific gravity of the must.

When the grapes are not ripe the color of the berries is rather red than blue, the skin is still hard, and the taste is rather sourish than sweet. If picked at this stage of incomplete maturity, the grapes yield a wine which retains a tart taste, which is due to the excess of tartaric acid. There is also less deep color and less fineness of taste if the grapes are overripe and rotten. This is due to the fact that when the grapes are in this condition the skin is already partially destroyed. It is also the explanation of the lack of intensity of the color, which, as it is well known, has its seat in the skins of the grapes. Aside from that, wines which are made from such material have a taste which is less frank; they are sweetish, contain but little tannin, and do not keep well.

In hot years the picking may be carried on without inconvenience from sunrise to sunset. It is advisable to let the dew evaporate, in order not to dilute the must. After being picked, the grapes should be carried immediately to the press.

STEMMING.—Before pressing, the grapes should be stemmed, an operation which consists in separating the stems from the berries. For this purpose the grapes are spread on screens, which are placed on the press and are then moved about with the help of forks or of rakes. In this way the berries are detached from the stems and fall to the bottom of the press tank; the stems alone remain on the screen.

Before stemming, the workingmen who attend to this, pick over the grapes a second time, and put aside the berries, or the bunches, which do not appear to them sound, and which have escaped the notice of the pickers.

The question as to whether stemming is useful or not, has for a long time divided viticulturists. It is certain that the presence of the stems gives increased activity to the fermentation. Nevertheless, the stems should not be present in the fermentation of fine wines, when the must already contains a sufficient quantity of ferments.

The stems consist of woody fibers; they contain ferments, juices, which hold in solution some of the substances which are contained in the grapes, tartar, tannin, a bitter substance, and various disagreeable tasting and smelling oils. If the stems contained only tartar, tannin, and the aromatic substances which are peculiar to the grapes, they would be useful in vinification, because they would give increased activity to the fermentation and would contribute to the preservation of the wine by increasing the quantity of tannin; but the fact that the above mentioned bitter and bad tasting substances dissolve in the must makes the presence of the stems in the vinification of fine wines quite inadmissible. These wines contain as a rule quite enough tannin to keep and clear them well, owing to the fact

that the pomace remains immersed in the must during fermentation. The stems should be allowed to ferment with the pomace only when the must is poor in sugar, or when the skins have been partially destroyed owing to overripeness. As in such cases the tannin is indispensable to the conservation of the wine, we should endeavor to increase its quantity.

In case of ordinary fermentations in open tanks, the wine makers crush into their tanks the bunches with the stems. Now, it is known that during fermentation a portion of the stems, skins, and seeds rise above the surface of the must and form the cap; as these substances are no longer immersed, they are consequently unable to impart color and tannin to the must; while, on the contrary, by keeping them constantly immersed in the must by the means of a frame, a much deeper color is obtained, with a great deal more tannin, and sometimes too much of it. By adopting this process, and by stemming only a portion of the grapes, it is possible to obtain mellow wines, which still contain a quantity of tannin sufficient for their conservation.

Often the taste of the stems is not due to the fact that the grapes have not been stemmed, but because the wine has remained too long in the fermenting tank. Several experiments which we have made in Southern France, and in Greece, have proved to us that by not stemming very sweet varieties the fermentation was more active. We have also noticed that under these conditions, and particularly *if the must did not contain enough ferments*, the wine which was made from stemmed grapes had less color and tannin than that which was fermented with the stems.

FOULAGE.—The foulage consists in crushing the grapes and in breaking the cells which contain the saccharine matter, the yeast, and the other constituents of the pulp.

This operation, which is very easy, is performed at the press by men with their naked feet or with wooden shoes.

In order that the crushing should be complete, the must is allowed to run off in proportion as it is formed in a small vessel under the tank, and the charge is again treaded until there remains nothing more in the tank but completely crushed skins and seeds. There have been devised several machines for crushing the grapes; few of the wine makers use them, because the crushing, particularly of stemmed and ripe grapes, is a very simple operation. Aside from that, these machines, which consist mainly of cylinders, *tear the berries without crushing them.* The mu-t, as well as the skins and seeds, should be run immediately into the fermenting tank. When a charge is filled into a tank, it should be done as much as possible the same day, in order not to disturb the fermentation, when it has once started. The violent fermentation begins about eight to twelve hours after the must has been filled in, according to the surrounding temperature of the fermenting-room.

It has been noticed that the wines of the Medoc, which are made without the berries being crushed, have less color than those which are made from the same varieties when they are crushed, but that they possess distinctly a finer taste; therefore, in years when grapes reach their full maturity, the proprietors of the high quality (*grands crus*) vineyards do not have their grapes crushed. They perform this operation only in

NOTE.—It is preferable that the crushing should be done with naked feet, for thus the crushing of the seeds, which contain a bitter substance, is avoided; also, the trituration of the skins can be done more thoroughly with naked feet than with wooden shoes.

years when the grapes have not acquired a sufficient degree of maturity, and when they have reason to fear that the color of the wine will not be deep enough. If the stemmed grapes are fermented without having been previously crushed, there results a larger quantity of press wine, and often this wine has a sweetish taste. Mixing the latter with the rest of the wine should be avoided as much as possible, as it gives rise to secondary fermentations which destroy the mellow character of the wine.

FERMENTING TANKS.—The construction of the fermenting tanks has given rise to many discussions among the inventors who have discovered what practical people have already known for a long time. They have devised various fermenting tanks which, according to them, it is much more advantageous to use than the ordinary tanks. Most of these systems are given up to-day. The practical viticulturists know from experience that the fermentations in covered or in open tanks can give equally good results, if the fermentation is conducted with intelligence, and if the murk is drawn off at the proper time. The method of fermentation, however, which unites the most numerous advantages, and that which has been sanctioned by long practical experience and by the experiments of the œnologists, is the fermentation in covered tanks (the covers being luted to the tanks by means of plaster of Paris or of clay), with an inner frame, the gases being consequently under pressure. The advantages which this kind of fermentation offers, compared with that in open tanks, consist chiefly in the formation of a larger quantity of alcohol and in the superior fine and mellow taste.

The increase in the color is due to the complete and constant immersion of the skins, which produce a good deal more color under these circumstances than if they are carried up to the surface of the must. This happens in the ordinary fermentation in open tanks, owing to the formation of the cap.

The superiority of the taste and its velvety character are chiefly due to the compression of the gases and to the complete solution of the mucilaginous substances.

Most of the high quality red wines of the Medoc, the first crop Saint-Emilion, and the first crop Graves, are fermented in covered tanks. We say "most," because a certain number of wine makers follow yet the ancient custom of making their wine in open tanks.

DRAWING OFF THE MURK.—The fermentation does not go through every year in the same length of time; it is more rapid in hot years than in cold years, aside from the influence which the temperature of the must at the time of its leaving the press exercises—one which increases during fermentation. The use of open or of covered tanks, the density of the must, its composition, the temporary or constant immersion of the cap, or its remaining on the surface, the partial or complete stemming, all these circumstances have an influence on the duration of the fermentation. The fermentation, as a rule, goes through more rapidly, the must and the atmospheric conditions being the same, if open tanks are used, and if the stems are present, and if the cap remains immersed, than if the grapes are stemmed, and if the tank is covered, the cap being allowed to float on the surface of the mash.

That the fermentation is through can be recognized by the taste, if one has a great deal of experience; by the specific gravity of the must; by the temperature of the liquid, and its limpidness (when the liquid is

almost cold and clear). The fermentation is not completed if the liquid is warm, sweetish, and turbid.

The wine maker should be extremely careful to see that the violent fermentation is entirely completed in the fermenting tank. Wines which are still fermenting and sweetish should not be filled into barrels, nor should they be allowed to remain in the tank after the fermentation is over. In the first case, the wine remains a long time sweet in the barrel, and after its alcoholic fermentation is over there often remain in suspension ferments which make it difficult to fine and preserve without an after fermentation. They also make it liable to become acid. In the second case, if the tanks are open and no frames are used, the cap is liable to sink down and to impart to the wine acidity and a disagreeable taste of stems.

VINIFICATION OF THE INFERIOR VARIETIES.—Most of the proprietors of the ordinary varieties of the Gironde, and of the south of France, neglect the necessary precautions which should be taken during the critical period of fermentation. They have picked their grapes all at the same time, notwithstanding their vineyards are stocked with varieties which attain their full maturity at different periods; the result is that the grapes of the early ripening varieties are ripe and even partly rotten while others are still green. The must which is made from such material is never in the proper condition. The green berries give to the must an excess of tartaric acid, which imparts to the wine tartness; and the rotten berries, whose skin is partially destroyed, yield only a very small amount of coloring matter.

The grapes which have been picked in this condition are crushed without having been previously stemmed and are thrown into an open tank, in which they ferment more or less rapidly, according to the temperature of the surrounding air.

After the violent fermentation has well started (eight or twelve hours after the tank has been filled), the pomace is carried by the carbonic acid to the surface of the liquid, where it forms a crust called the *cap*.

When the tank is full the cap comes in immediate contact with the atmospheric air, by whose oxygen it becomes acidified, and with the progress of fermentation the surface of the cap passes from acidity to putridity.

When the tank is not quite full the carbonic acid gas is given off freely; but as its specific gravity is greater than that of the air, there remains naturally in the tank a layer which partly protects the cap from contact with the air.

When the fermentation is over, the cap, no longer held on the surface by the evolution of carbonic acid, sinks down in the liquid, and unless the latter is drawn off immediately imparts to it acidity, a bad taste, and even putridity. This happens particularly in years when the weather is very warm during vintage. The fermentation is then very rapid, and it may happen that it goes through in half of the time which is required in ordinary years. Notwithstanding this, negligent wine makers often allow their young wine to remain in the fermenting tank the same time as under ordinary conditions.

The wine makers who ferment their wines in open tanks, should, in order to avoid accidents, *watch attentively the proper time for drawing off the murk;* they should fill the tanks but to a height of twenty inches

from the top in the great tanks, and twelve inches in the small ones; the next day after filling the tank, they should cover the cap which begins to form, not with stems, which acidify too easily, but with a layer of straw, about eight inches thick.

There are wine makers who have the bad habit of filling their tanks not at once, but several times; and after the lapse of several days the first portion of the charge is in the state of violent fermentation, when they add some fresh must in order to fill the tank. They thus expose the wine to the danger of souring, interrupt the fermentation, and may make the wines sweetish or cause them to acquire a taste of stems, because they have remained too long a time in the fermenting tank. When the wine has been drawn off, the pomace remains in the tank. The wine which is contained in this pomace can be recovered by submitting it to the action of the press until nearly dry, after having taken the precaution to remove the upper crust of the cap which has become acid.

The wine thus obtained, which is called *press wine*, is very turbid, very harsh, and sometimes acid, particularly if the upper crust of the cap has not been well removed.

Most of the makers of ordinary wines follow the deplorable custom of mixing their press wines with the clear portion of the wine which has been drawn off from the fermenting tank without first clarifying it. They should put this wine aside, for by doing otherwise they make the best portion of their wine turbid and difficult to fine.

When the fermentation is conducted in closed vessels—aside from the superiority of the wine, there is no chance for the wine to become altered by the acidity of the cap, even if the fermentation should not be attentively watched; for, if the pomace is kept down by frames, the formation of a cap does not take place.

These precautions have a too great importance to be overlooked by the wine makers. To neglect them, one would have to be the enemy of his own interests.

THE VINIFICATION OF WHITE WINES.

General Observations.—The white grapes are pressed immediately after having been crushed. The must is poured directly into barrels or casks. The vinification of the white wines differs from that of red wines in this respect: that the must is entirely freed from the skins and seeds.

The fermentation starts in the barrels more or less rapidly according to the initial temperature of the must and of the fermenting-room, and according to the amount of saccharine matter contained in the liquid. As a rule the white wines are in violent fermentation twenty-four hours after the must has been filled into the barrels. The fermentation begins in the same way as with the red wines in tanks, by the evolution of bubbles of carbonic acid, which rise to the surface of the liquid and carry with them light matters (such as fragments of skins, woody substances, etc.), which they meet on their way. These various matters which form in the fermentation of red wines produce in the white wines a foam, which rises to the surface of the liquid, and is thrown out of the barrel through the bunghole if care is taken to fill up with new must every day. In this way the wine is freed from a part of its lees, and of the superabundance of ferments. If the barrel is not full, the foam sinks back in the wine, the fermentation becomes more active, and a less mel-

low wine results than when the escape of the foam has been promoted by keeping the barrel full.

The rise in the temperature of the must is generally not so great in the fermentation of white wines in barrels as in that of red wines in tanks.

The decomposition of the saccharine matters, and their transformation into alcohol, require a much longer time than is the case with red wines, particularly if the must is rich in sugar; this fermentation lasts sometimes until the month of March. In order to facilitate the escape of the foam, and the irresistible evolution of carbonic acid during the violent fermentation, the bunghole should be only covered by a chip of wood, or by vine leaves loaded with sand, when the fermentation becomes less active. Ultimately the bung is driven in loosely, as soon as no more foam escapes.

The barrels with white wine should be placed with the bunghole up, and should be filled regularly every day when the fermentation is violent, and at least twice a week when the fermentation is less violent.

THE DIFFERENT VARIETIES OF WHITE WINE.—There are three species of white wine: (1) Dry white wines; (2) mellow white wines; (3) sweet white wines.

These differences are chiefly due to the density of the must.

The dry white wines are those whose alcoholic fermentation has been complete and whose entire saccharine matter, which could be recognized either by the taste or the saccharometer, has been transformed into alcohol.

These wines are fermented as soon as the grapes are perfectly ripe (without, however, allowing them to rot). The specific gravity of the must varies according to the more or less favorable weather, according to the site of the vineyard, and according to the varieties; but the maximum rises seldom above 13 degrees Baumé.

The mellow white wines are those which retain after the violent fermentation a small quantity of fruit sugar which is not transformed into alcohol. The small quantity of mucilaginous substances imparts to the wine the mellow and the oily taste. In order to obtain such a wine, it is necessary to increase the density of the must. In the Gironde this is done by allowing the white grapes to become mellow, and by picking them only when the skin has acquired a brownish tinge.

The density of the musts is from 12 to 15 degrees Baumé. Such is the specific gravity of the musts of the Sauterne, Barsac, Bommes, Presgnac, etc., in vintages favorable to the maturity of the grape crop. These wines stand between the dry and the sweet wines.

The sweet white wines are those which retain, after their alcoholic fermentation, a considerable quantity of saccharine matter, which makes them very sweet. It is important that the specific gravity of the must should be greater than that, which is necessary to obtain simply mellow wines; and in order that they should remain sweet on aging, the specific gravity should be from 15 degrees to 20 degrees Baumé.

VINIFICATION OF THE HIGH QUALITY WHITE WINES OF THE GIRONDE.

VARIETIES OF VINES.—The varieties which produce the high quality wines are the *Sauvignon* and the *Sémillon*. There are some vineyards which are stocked with *Raisinotte*, or sweet *Muscadet*.

The Sauvignon.—This variety yields small bunches with small berries, which press one against the other; their musk taste is very fine. The wine which is obtained from this variety has much flavor and bouquet, and also a high alcohol-percentage.

The Semillon.—Bunches and berries of medium size; fine, mellow taste. The wine which this variety yields retains (the specific gravity of the musts being the same) more of a mellow taste than the *Sauvignon;* it soon becomes flat, however, and turns reddish if it has been allowed to remain in contact with the air.

These two varieties form the foundation of the high quality white wines. They combine the qualities which, taken together, make a perfect wine—fineness of taste, agreeable and decided flavor and bouquet, joined to a very mellow taste.

The Raisinotte (also called *Sweet Muscadet*).—This variety, which some grape growers of Barsac cultivate, together with the two first mentioned ones, yields bunches and berries of medium size, whose taste is similar to that of the Muscat and of the Sauvignon. When perfectly ripe the berries show brown spots; the skin, which is very thin, bursts very easily if rain happens to fall during the time of the vintage. The wine which is made from this variety shares the qualities of those which are made from the two above mentioned varieties.

The three varieties which we have described are the only ones which are actually grown in the vineyards producing the best wines. In former times some poorer varieties were raised, but at present they have been entirely discarded.

VARIETIES YIELDING SECOND-CLASS WINES.—The varieties enumerated below are frequently found with the varieties which we have already mentioned, particularly in the districts adjacent to Barsac and Sauternes. These varieties are: *Prueras, Malvoisie,* white *Verdot, Cruchinet,* white *Muscat,* golden *Chalosse,* or *Petite Chalosse, Enrageat,* called also *Piquepoule Folle-blanche* (which is very prolific), the *Blagnais,* the *Verdot gris,* the *Jurauncon,* and the *Grosse Chalosse.* These latter are prolific, but yield only ordinary wines.

PICKING THE GRAPES.—When the grapes are overripe, and have reached a convenient stage of desiccation, the vintage may begin. The picking should be done only by degrees, sorting as we go. First, the overripe and sufficiently dry berries are picked. It often happens that a portion of the bunch, the one which is turned toward the south, and which is consequently most exposed to the sun, is already overripe, while the side which faces the north is not yet ripe. In this case, berry after berry is picked, and the berries which are not yet overripe are left on the stem.

A second picking is done as soon as there is a convenient quantity of overripe or dry bunches and berries. The number of times which the picking may be repeated is indefinite; this depends upon the temperature, upon the weather being dry or rainy, and upon the more or less favorable site of the vineyard. When the temperature is favorable the grapes are picked at least three times. When it is cold and very moist—in order not to lose the whole crop—it is necessary to pick the grapes not only before they are overripe, but also some time before they are at all ripe; for the humidity, by dilating and bursting the skin, exposes the fleshy and liquid part of the berries to the contact of the air. Under

such conditions these berries begin to ferment and pass rapidly from alcoholic fermentation to acidity, and even to putridity, particularly if the rain continues.

It is necessary in unfavorable years to watch the crop attentively, and to detach the spoiled berries, in order to prevent the contagion from spreading. But, anyhow, too great haste should not be made in harvesting the crop; a sudden change in the temperature may occur; it may stop raining; in a word, the grape grower should not sacrifice the quality of the crop except when there is no hope of obtaining any, and when the crop threatens to become a total loss.

Filling the Must into Barrels.—The precautions and manipulations in washing the press are the same as for the red wines, with the exception that the sponging is done with water, and not with alcohol.

The barrels destined to be filled with wine should be prepared in advance. This preparation consists of washing them with boiling water; rinse them afterwards and let them drain.

The must should be poured in not later than the evening of the day when the pressing is done; the barrels to be filled up to two inches from the bunghole, in order to leave only the necessary space for expansion, which is produced by fermentation. As soon as the foam appears the next day on the surface, some must should be added, in order to remove the foam from the barrel, and thus to free the wine from a portion of its natural ferments.

Various Proceedings to Augment the Density of the Musts.—In the following are given various means of increasing the density of musts from white or red grapes, with the object of making sweet or mellow wines, without using saccharine matters foreign to the grape. The processes which we are going to describe are particularly used in cold countries—in Germany, etc.—either for making sweet wines or simply for improving the ordinary wines. These additions make them mellow—destroy the tartaric acid, which the green grapes contain in excess.

Sweet wines may be made where the density of the must is higher than 25 per cent. Below 25 per cent the wines do not remain sweet; it is, besides, very easy to regulate the density which it is desired to obtain by preliminary experiments.

These processes should be used only in case when it is impossible to increase the density by the solar heat in a natural way, or if the varieties ripen slowly, or if they have a thick skin. They are consequently used but for the improvement of ordinary wines.

1. The grapes are picked as ripe as possible; the spoiled berries are sorted out, and the rest exposed to the sun on straw or on boards during several days. At night they are stored in dry and well ventilated garrets.

2. If the weather is rainy, or if it is cold, the solar heat may be replaced by the heat of a furnace. For this purpose the grape bunches are placed on screens and introduced in a baking furnace after the bread has been taken out. The desiccation is stopped after the density has been conveniently increased by the volatilization of a part of the water, and by the transformation of the tartaric acid into glucose.

As far as the increase of the density by a foreign saccharine matter is concerned, aside from the expense caused by these operations and the

bad taste imparted to the liquid, we disapprove of their use; they do not fulfill their aim. We speak now of the ordinary wines of cold countries, where the grapes do not easily reach their maturity, and where they contain an excess of tartaric acid. The heat, as is well known, transforms this acid into glucose (fruit sugar), which imparts the tart taste to the wine. In the absence of natural heat, artificial heat accomplishes the same purpose. Sugar or syrup are only used to increase the density of sweet wines from the south of France of ordinary quality. The introduction of a certain quantity of candy syrup into musts showing a low density, produces, it is true, a mellow wine without bad taste; but this sweet taste is insipid, and has nothing in common with the taste known as "rôti," so called by Frenchmen. Only the sun can produce this, and it makes the white wines of the Gironde stand without rivals in the world. Besides, if syrup is added to wines which are already fermented, it is necessary to fortify them so as to give them 15 to 16 per cent of alcohol; because otherwise they could not be preserved under the ordinary conditions without fermenting and becoming turbid.

PART II.—WINES, THEIR CARE AND TREATMENT IN THE CELLAR AND STORE.

CHAPTER I.

GENERAL TREATMENT OF WINES.

General remarks. Influence of contact with the air. Influence of the variations of temperature. Influence of the deposition of the ferments, and of the lees; measures by which a sudden spoiling of the wine can be avoided. Suitable premises for storing wines; cellars, store-rooms, etc. Precautions which should be taken to avoid the loss by evaporation, and to maintain a regular temperature in the cellars; ventilators; difference between the loss by evaporation in a ventilated and in an air-tight cellar. Humidity; methods of diminishing the same. Arrangement of frames and supports for casks; materials suitable for the purpose. The piling up of the casks; utensils and apparatus; Bordeaux method. The piling up of casks in the warehouses of Paris. Machines for piling up. Racking of the wine; utility and various objects of racking; most favorable conditions of time and of temperature for racking. How to do the racking; Bordeaux method. Cleanliness. Macon method. Transfer of wines from one barrel to the other; various systems of pumps, syphons, etc., for racking. Sulphurous acid gas; its nature and properties; its use in the treatment of wines. Sulphur wicks; their manufacture, etc.

General Remarks.—The care and attention which should be bestowed upon wine making includes not only the manipulations which are necessary to keep the wines in a good and sound condition, but also the means necessary to promote their aging, by developing in them all the qualities which they are capable of acquiring. It comprises also the remedies against the diseases or defects to which they are subject. Three important conditions should be fulfilled in order to reach this end:

1. The wine should be preserved from contact with the air.
2. The wine should be maintained at a uniform temperature.
3. The wine should be freed from the ferments and lees, and its complete clarification obtained without injury to its future development.

Aside from these precautions of a general character, it is very important to taste and to watch continuously the progress of the wine, in order

to prevent by the proper measures after-fermentations, which originate particularly in mellow wines, and which, by transforming the mucilaginous substances into alcohol, destroy the fruity taste. The details of these measures will be given on each occasion, when speaking of the particular treatments which are adapted to each kind of wine.

The remarks which follow are applicable to all *natural* table wines—that is, to unfortified wines. These wines contain from 7 per cent to 15 per cent of alcohol, according to the climate and variety of the grape. We reserve a special chapter for the liqueur and sweet wines, as the conditions which should be observed to preserve them in a sound state are different.

INFLUENCE OF CONTACT WITH THE AIR.—If the wine is allowed to come in immediate contact with the air, several changes occur in its condition. A part of the alcohol evaporates as well as the bouquet and the flavor, and if the contact is a prolonged one a whitish scum called "flowers" is formed on the surface of the liquid. These "flowers" are nothing else but mold of a peculiar nature, which is produced by the growth of microscopical fungi, called *Mycoderma vini* and *Mycoderma aceti*, and which develop rapidly by budding.

This mold, which is impregnated with acidity, communicates to the wine a disagreeable taste, known under the name of *flatness;* it also renders the wine turbid and introduces acid ferments in the same. Sometimes when the wine contains an appreciable quantity of sugar this mold will not thrive, but then the wine undergoes an alcoholic after-fermentation. If not speedily protected from the contact with air, it will become pricked, and will be transformed later into vinegar. Science explains this transformation of wine into vinegar by the action of the oxygen of the air, which, oxidizing the alcohol, changes the same into acetic acid. All the alcoholic liquors are susceptible of undergoing acetic fermentation on coming in contact with air, water, and a ferment. It is also known that most wines contain ferments. According to M. Pasteur, the acidity is due to a special ferment—the *Mycoderma aceti*. However this may be, the wine can be transformed into vinegar more or less rapidly and completely (and often without the mold appearing on the surface) at temperature ranging from 32 degrees to 212 degrees, but the temperature which most actively hastens this transformation is between 77 degrees and 104 degrees Fahrenheit. The alcohol which is contained in the wine changes gradually into acetic acid.

The vinegar which is allowed to remain in contact with the air loses its strength in its turn, excepting in cases where there is still a certain amount of sound wine present; the acid is by and by destroyed, and at last the liquid becomes entirely spoiled or rotten. On the whole, wines to which the air has access can undergo three different fermentations: The alcoholic after-fermentation—which is often termed in the business "the working"—changes into alcohol the different mucilaginous substances which are contained in the wine. This fermentation will proceed, if it has once started, without the air having access. Sometimes this fermentation is very injurious to the future of the wine, as it destroys the fruity taste. We shall have an opportunity to speak of this subject later.

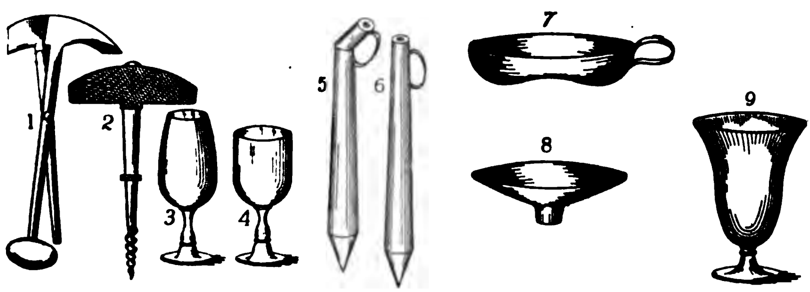
The acetic fermentation transforms the alcohol of the wine into acetic acid, and the wine thus becomes vinegar.

The putrid fermentation is, as its name indicates, a decomposition of the acid. At this stage neither the taste of wine nor of vinegar can be recognized; it is nothing but a spoiled liquid.

These different transformations may take place in wines of every quality, whose alcohol-percentages are below sixteen, if they remain exposed to the air.

Wines whose alcohol-percentage is a very low one become putrid and decompose without a preliminary acetic fermentation. The reason for that must be assigned to their relative weakness; as they contain but little alcohol, they can yield but little acid.

As far as the liqueur wines—for instance, port, Malaga, Alicante, etc.—are concerned, two agents retard their transformation under the influence of the air; the quantity of alcohol which exceeds 16 per cent, together with the large quantity of sugar, which several varieties contain, keep up in them, if the air has access, a slow fermentation, which, by transforming a part of the mucilaginous substance into alcohol, stops and often even prevents the beginning of the acetic fermentation. Their high alcoholic percentage, which is very often increased by the addition of alcohol, retards the alcoholic fermentation and prevents putrefaction.



IMPLEMENTS FOR TASTING.

1. Hammer for using in tasting. This tool is used to make gimlet holes by means of the awl, which is screwed onto the extremity of the handle *c*; *a* serves for pinchers with which to take out the pigots, and may be used as a hammer and the sharp side for cutting plugs.
2. Gimlet, such as used in Macon.
3. Crystal glass for tasting old wines with considerable bouquet.
4. Ordinary tasting glass.
5. Pocket thief of silver or tin.
6. The same in glass.
7. Silver cup, Macon pattern.
8. Silver cup, Bordeaux pattern.
9. Graduated measure of glass.

These wines, however, are not always exempt from changes under the influence of the air. Their alcohol-percentage and their bouquet decreases; an alcoholic fermentation sets in which destroys their sugar, and this loss, combined with the decrease in alcohol, favors a rapid setting in of the acetic fermentation; it happens even often that the presence of the acid shows itself plainly before all the sugar is changed into alcohol.

The wine can be considered protected from the immediate contact with the air, if the barrels are made of sufficiently thick and well-fitting staves, and if neither porous nor dripping wood has been used for this purpose. It is necessary, besides, that the casks should be completely filled and well bunged.

On the contrary, the wine can be considered to be in contact with the air if the barrels are not completely filled, if they are not carefully bunged, or if they have leaks.

INFLUENCE OF A VARYING TEMPERATURE.

It is important that the premises in which the wine is stored should have a constant temperature. In our climate, the average temperature of the cellars is from 59 to 62 degrees, but these variations of temperature depend upon a more or less favorable location, and upon the precautions which are taken to prevent the access of the air. We shall speak a little later of the places which it is most advisable to choose for this purpose. The variations of temperature produce in the wine, in the same way as in other liquids, changes of density and of volume—a lowering of the temperature produces contraction of the liquid; a rising, on the contrary, an expansion. Thus, if a barrel is completely filled with wine and placed in a cellar, the temperature of which is lower than that of the wine, the wine will decrease in volume, and an empty space in the cask will appear. In most instances, this contraction is favorable to the deposition of the lees, but it has the disadvantage that it produces in the casks an empty space, which often results in the drying up of the exterior surface of the staves, and thus affords a passage to the air.

In this case it is necessary either to fill the cask or to draw off the wine in order to preserve it from contact with the air.

When the temperature of the store-room is higher than that of the wine, the latter will expand, In addition to the danger which results in leaving the wine in such a condition, on account of the pressure it will exert against the staves and against the bottom, the expansion may produce a rising of the lees which had been already deposited, and thus render the wine turbid, and impart to it the bad taste of the lees; besides all that, such an expansion will predispose the wine to all kinds of after-fermentations.

INFLUENCE OF THE SETTLING OF THE FERMENTS AND OF THE LEES; MEASURES BY WHICH SUDDEN SPOILING OF THE WINE CAN BE AVOIDED.

The importance of settling the ferments and the lees is acknowledged; the turbid wines are liable to undergo an after-fermentation, which may be either an alcoholic or an acetic one; they easily acquire the bad taste of the lees, a certain bitterness, etc. In all wines a continuous separating out of insoluble matters is going on; certain matters, among them the coloring matters, several mineral and organic salts, etc., which at first were dissolved in the wine, become insoluble, and form a precipitate at the bottom of the barrel, or remain in suspension; these are the matters which, together with the ferments, form the lees. There is more or less of this deposit in a wine, according to its character, and according to the care which has been bestowed on the same during vinification. The most voluminous deposits are formed in the first year; they decrease in volume and in consistence at every racking, if the wine is carefully treated. When the wine is well nigh free from them, and when it has reached its full development, the deposits amount to almost nothing, but they increase anew if the wine begins to deteriorate.

The deterioration of the wine can be prevented by bottling it before it has lost in the barrel a portion of its alcohol and its fruity taste. Bottled wine, as a rule, keeps well and improves in quality, while if the same wines be left in the barrel they become harsh and dry and lose their flavor, and consequently their full value.

Wines are freed from their deposits and ferments by different means, according to circumstances: by allowing them to settle slowly, by lowering the temperature, by racking, and by treatment with finings. We shall give further on the practical details of these different operations.

THE STORAGE OF WINES—CELLARS, STORE-ROOMS, ETC.

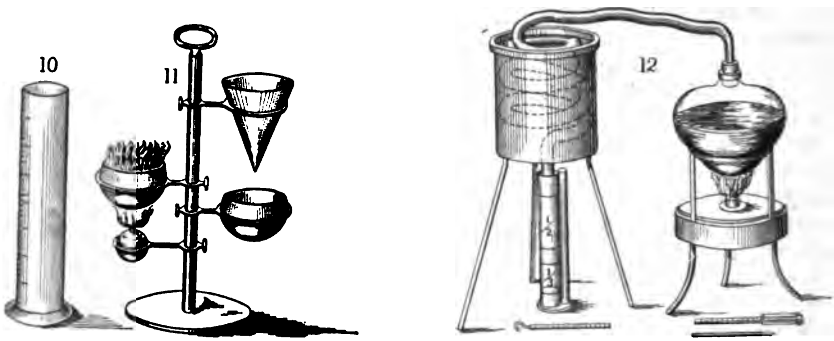
A wine cellar should combine two essential conditions: uniformity and regularity of temperature at all seasons; further, the loss which is produced by evaporation should be as small as possible in a good cellar.

In former times, a third condition was indispensable; it was necessary to avoid the humidity, which, by causing the wooden hoops of the casks to rot rapidly, often gave rise to loss of wine. For this reason the cellars were ventilated by air-holes. Through these openings the air could be constantly renewed, and thus the excess of humidity was got rid of, but the evaporation was thereby considerably increased, and the maintaining of a regular temperature rendered impossible. In those days the casks had wooden hoops only, and it was necessary to watch carefully their exterior surface. In some air-tight cellars they rotted in less than six months. To-day the custom of hooping the casks exclusively with iron has become general, and proves not only more economical than the ancient one, but it is also indispensable for the security of the wines which are destined to age, and which are placed in close cellars. Thus, while checking the humidity of the cellar by appropriate means (which we will mention later on), it is necessary to make the cellars perfectly close, and without direct communication with the outside; vertical ventilators which close hermetically are admissible.

PRECAUTIONS WHICH SHOULD BE TAKEN TO AVOID THE LOSS BY EVAPORATION AND TO MAINTAIN A REGULAR TEMPERATURE IN THE CELLARS. VENTILATORS; DIFFERENCE BETWEEN THE LOSS BY EVAPORATION IN A VENTILATED AND IN AN AIR-TIGHT CELLAR.

The cellars should be exposed as much as is necessary to the north, and should be protected on the south side either by adjacent buildings or by thick walls. The best cellars are those which are dug out of the ground or excavated to the depth of one to three feet, but this only in cases where the subsoil is not too moist. If the cellars are built as above, it will be necessary to surround them by trees, in order to protect them from the heat. Then they should have no permanent communication whatsoever with the surrounding air, neither by windows nor by air-holes; all the openings of this kind should be shut and the ceilings be plastered.

It is important that the cellar should have but one outlet—the door—exposed to the north, if possible. There should be, besides, at the entrance, one or two smaller rooms, which can be utilized as workshops, or as temporary store-rooms. These rooms should have double doors, which should be kept closed, particularly when the weather is warm. The lofts



COMMERCIAL ANALYSIS.

10. Graduated cylinder, holding one liter.
11. Small apparatus for evaporating and filtering liquids according to the system of Guyton-Morvaux. It is used advantageously for ascertaining the nature of the salts, saccharine matters, and residues which liquids contain; also, for filtering samples.
12. Distilling apparatus of Salleron, ancient pattern.

above the cellars should be plastered, and during warm weather ventilated, particularly in large establishments. Ventilators are useful for lowering the temperature of the lofts and of the *warm cellars*. It is the best plan to give them the same form as to those of steamships; they should rise above the roof for at least three feet and be topped off by a vane, which should be soldered on above the air-hole. This vane should be movable, and arranged to present the opening to the wind. If it is necessary to lower the temperature of the cellar, an hour ought to be chosen when the temperature of the surrounding air is at its lowest point. It is best to open the valves of the ventilators in summer at about three or four o'clock in the morning, and to close them at six o'clock, after having watered the floor abundantly. If the lofts are not plastered, all the seams between the boards should be calked. Aside from that, these lofts should be always filled with various merchandise, boxes, timber, etc., in order to prevent the access of hot air to the cave, else it will be advisable to cover the floor with a layer of fine and dry sand.

As far as the cellars with garret windows, which do not have a loft, are concerned, it cannot be expected that a regular temperature could be maintained in them, even if they are plastered, as the heat penetrates through the roof. The most convenient place for storing wine is a vaulted cellar, which has no direct communication with the surrounding air.

If it is desirable to maintain a regular temperature in cellars which have been constructed in former times, the best way to reach the desired end will be to do away with the air-holes, particularly with those which contribute towards producing draughts; further, by adding a new room at the entrance, by plastering the ceilings, and by constructing the lofts in the manner described above. If, during the great summer heat, the temperature of the cellar rises, which should be always ascertained by a thermometer, it can be lowered several degrees by watering the soil with fresh water at about 60 degrees, and by keeping the cellar well closed afterwards; but if the heat penetrates through the lofts or through the spaces between the boards, the casks must be placed as near as possible to the ground. As a matter of fact, in this kind of cellar there

has often been observed a difference of 20 degrees between the temperature near the surface of the soil and near the ceiling. Thus, on warm days it is not infrequently observed that the temperature in the neighborhood of the ceiling rises as high as 86 degrees, while that near the soil is not higher than 64 degrees. This fact explains itself by the expansion of the warm air, which, being specifically lighter, remains in the upper parts of the cellar.

The loss of wine by evaporation depends essentially upon the manner in which the store-room and the casks are arranged. The loss varies from 3 to 10 per cent, according to the ventilation of the cellar. The laws of France in the dealings of the wholesale merchants recognize, in bonding, an allowance of 8 per cent per annum. In dry cellars, where the air is constantly renewed through air-holes, through the windows, or through the garrets, evaporation attains the limits which are allowed by the law, and even goes beyond, particularly if the wines are kept in barrels with thin staves, barrels which are not well built, and hooped with wood or hoops which they have neglected to drive down. When the hoops become dry, the waste may reach 10 per cent—extraordinary leakage. In cellars which are perfectly air-tight, and particularly in those which are vaulted, the wines which are kept in strong and iron-hooped barrels show hardly a loss by evaporation of 3 per cent per annum.

The cellars of many of the wine makers of the Gironde, and generally also of other wine-growing countries, are in a poor condition for storing wines and for preventing loss by evaporation. Indeed, with the exception of the proprietors of the celebrated vineyards of the Medoc, where it is very important to treat their wines carefully and to reduce to a minimum the loss by evaporation, the cellars of the producers are, in most instances, nothing but barns, in which the air circulates freely, and whose temperature varies, in accordance with the temperature outdoors. Very few of these buildings have either a ceiling or are plastered, and the racking, filling up, and tasting are done with the doors and windows open—all done to economize light, and to avoid that rotting of the staves of casks (which are hooped with wood) which would take place under the influence of darkness and humidity.

Wine makers should consider that by allowing the free circulation of air in their cellars they lose every year, through evaporation, 3 or 4 per cent of their vintage, to say nothing of the difficulty they experience in selling their old wines, owing to the faults which they acquire through the contact with the air and carelessness. These faults are *dryness*, *acidity*, *harshness*, etc.

The decrease in the loss by evaporation would pay them largely for the cost of renewing the wooden hoops, and their wines would have a greater value if the cellars were conveniently built and perfectly close. They may avoid the expense of renewing the wooden hoops by using iron hoops.

In former times the difference in the value between the wooden and iron hooped barrels was great—the price of the wooden hoop was low, and that of the iron hoop high; but to-day the wooden hoop becomes more and more scarce, and its price shows an upward tendency, while that of the iron hoop remains stationary.

If there is good reason for not having the cellars close, as, for instance, where the wines are temporarily stored in magazines, sheds, etc., it is

impossible to avoid the loss by evaporation, but it is possible to prevent injurious changes in the wine. Keep the casks always well filled. The filling up should be done every five days, and if the wines are new, they should be permanently bunged. After-fermentations can be prevented by frequent rackings. If the wines cannot be racked, they should be transferred into sulphured casks, without bringing them in contact with the air. They should be often tasted, in order to ascertain if any working is going on in them. If the casks are entirely exposed to the air, they should be covered with tarpaulins, which should, in turn, be frequently wetted.

The same precautions should be taken with old wines; they should be drawn off as soon as the barrel shows a quart or more of ullage.

HUMIDITY—MEANS OF DIMINISHING THE SAME.

Humidity is unavoidable in close cellars. An amount of moisture, not too great, is useful, because it reduces the evaporation of the wine; but too much humidity promotes the rotting, not only of the wooden hoops perhaps, but also of the casks themselves. An excess of moisture is corrected by the following means: The soil of the cellars should be kept clean and well beaten, and thus be made almost impervious; this precaution is indispensable in order to avoid the humid and sometimes putrid emanations of the earth.

If the cellar is built in a marshy place there should be taken off from the surface of the soil a layer of earth about one foot thick, which should be replaced either by pulverized soft rock, by a mixture of lime, sand, and fine gravel, by clay mixed with pebbles, or by the waste from iron works, fragments of iron, and charcoal, which are well beaten into the soil so as to form an impervious layer. These compositions are allowed to dry, and if the moisture which they exhale during drying is too abundant, the drying is hastened by means of a chafing dish. When the soil has well hardened it is covered with a layer of fine and siliceous sand, which has been previously dried in the sun.

If, notwithstanding these precautions, infiltration of water should take place, all the parts of the cellar where this has been noticed should be laid out with stone fragments or bricks, and cemented with concrete.

There should never be left in the cellar any kind of matter susceptible of attack by humidity; for if such a matter is once impregnated with moisture it contributes to make the cellar still moister. Besides this inconvenience, the matter is apt to decompose under the influence of putrid fermentation.

The excess of moisture may be diminished by sweeping the soil of the cellar often, by scraping off the moss and the mold from the walls, by brushing off at every racking the mold from the casks, by taking away the moist sand which covers the soil below and between the casks, and by replacing it with dry sand.

Sawdust should never be used for replacing the sand with which the soil is covered, because if it remains there a long time it becomes impregnated with humidity, and increases the latter; but the greatest inconvenience connected with the use of sawdust is, that in this substance, as well as in all the woody and vegetable matters under the influence of the air and of humidity, a putrid fermentation is produced, which pol-

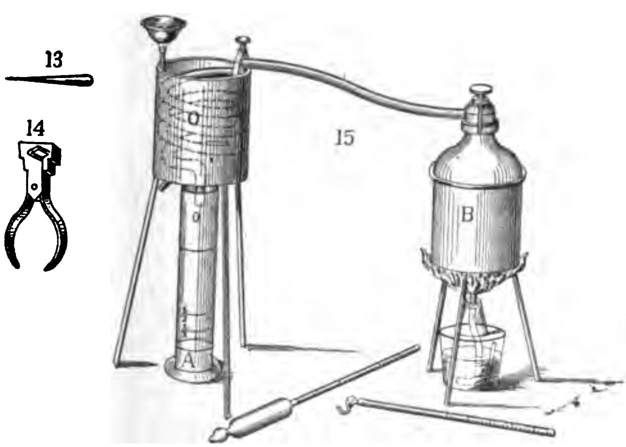
lutes the air, sets the wines fermenting, and, later, transforms the sawdust into manure.

Preference should be, therefore, given to fine siliceous sand, which has been previously well dried.

ARRANGEMENT OF FRAMES AND SUPPORTS FOR CASKS—MATERIALS SUITABLE FOR THE PURPOSE.

The supports are wooden timbers or other material, which are laid on the soil, being from six to eight inches high. The skids are destined to support the barrels in order to protect them from the humidity of the soil, also to facilitate the racking of the wine.

They may be made from different materials. In the country around Bordeaux blocks of wood from the *Pinus maritima* are generally used, for the sake of economy. These blocks are nothing else but young trees, which are roughly squared, of a diameter of six inches, and of varying length (eighteen feet on the average). In order to form a bench, two of these trees are laid on the earth, leaving a distance of two and two tenths feet between them (from outside to outside), if they are destined for Bordeaux barrels, or any other barrels of the same length. If the barrels exceed this length it will be necessary to increase the distance between the blocks in the same proportion. The blocks from pine wood are usually not connected by cross framing; when they are placed on the floor of the cellar they should be exactly level, and if some part of the block shows a protuberance, it should be sawed from below half of its thickness, so as to be brought nearer to the floor under the weight of the full barrels.



13. Ordinary plug for stopping up sample holes.
14. Pinchers (Maconese style) for withdrawing the plug.
15. Distilling apparatus of Salleron (new pattern); *C*, copper cucurbit; *O*, cooler; *A*, test tube used as receiver—used same as ancient pattern.

If blocks cannot be made profitably from pine wood, fir or any other soft wood may be used, which is simply squared. If the joists are cut more high than broad (six inches high by four inches broad, for instance), they should be connected by crossbeams, in order to prevent

their upsetting. It is advisable to use hard wood for the frame, such as oak, elm, etc., which resist rotting better and longer, but their high price is an obstacle to their use. In very moist cellars, however, there is no economy in using pine wood, for they rot very rapidly. It is more profitable in this case to build them of hard stone, which are sunk into the soil to a depth of about twelve inches, and which have above the soil the same dimensions as those made from wood; that is, a height of six inches and a width of six inches. The contact of the casks with the stones is avoided by covering the latter with a piece of wooden board. These frames are more expensive than those which consist of blocks of pine wood, but they are very solid, and cost less in the end. Their use makes the renewing unnecessary, which in moist caves has to be done sometimes every year.

We have already said that the blocks or timbers should be placed at a distance of about two feet from outside to outside, in order to support one row of *Bordeaux* barrels; the average length of these barrels being about three feet, it is reckoned that each row occupies in breadth a little more than three feet.

The passages between the rows, which are necessary for racking, rolling, etc., for attending to the Bordeaux barrels or to barrels of the same dimensions, should have the following dimensions, as far as their breadth is concerned:

Passages in which barrels can be rolled freely	4 feet.
Passages in which barrels can be rolled without passing	3¼ feet.
Passages for persons only	2⅔ feet.

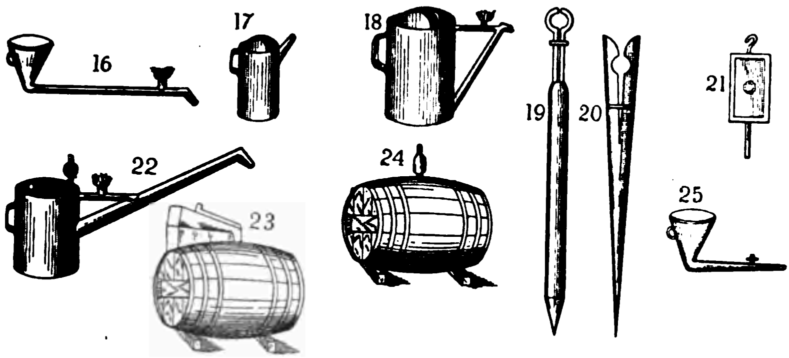
The work is done much easier, and consequently more economically, if all passages of a cellar have the breadth which is necessary for rolling, and in such a case, indeed, it is sometimes possible to place all the barrels which have to be rolled in the passages, leaving a space of eighty to one hundred inches; which allows the workingmen to circulate between the rows of barrels and to carry on with ease the movements of rolling, fixing, etc.

This is the most advantageous arrangement for doing the work.

The number of barrels which a cellar can contain is reckoned from its length and breadth; we know that the Bordeaux barrel occupies three feet four inches in length. and two feet two inches in diameter, and that the passages have to be from two and two thirds to four feet wide; therefore, it is easy to calculate the capacity of a cellar, without measuring row after row. The supports are arranged in two manners: In the cellars of the wine makers the rows are laid out in the longitudinal sense, while in the cellars of the wine merchant, and particularly if stock consists of a great variety of brands, they are laid out in the transversal sense to facilitate attending to the barrels.

If the rows are laid out in the longitudinal sense, first, one layer is formed from one end to the other of the cellar, on each side of the walls; then either one row is established in the middle, and the two ends of this row are left empty for facilitating the circulation, or several rows with passages between them, according to the dimensions of the cellar. In cellars which are very long, passages are made with a view to avoiding too long turns towards the middle of the row. This is the most frequent arrangement of the cellars of wine makers. In the cellars which are destined for the trade, one broad passage, six and one half feet wide,

is left on the whole extension of one of the walls, and the rows and passages are laid out perpendicularly to this broad passage; all passages end in the large passage, and all the rows rest against the other walls.



16. Z-shaped funnel, for ulling barrels placed in tiers.
17. Ulling can, containing from one half to one gallon, used to feed the Z funnel.
18. Tin can used for ulling. Usually it has on the inside a scale showing contents.
19. Iron candlestick, pointed at lower end, to be stuck into the wall, handle flat, to stand upright on barrel when necessary.
20. Wooden candlestick, made from large hoop, whose one end is sharpened for same purposes as iron candlestick.
21. Cellar candlestick used in north of France, with hook to hang to the crossbars of the barrels.
22. New filling pot, used instead of old Z funnel.
This instrument is filled with wine through a tube in the cover, which is afterwards closed by cork stopper; the air is allowed to enter through a small aperture below the spout, and which does its work as long as there is an empty space in the barrel. As soon as the barrel is full the opening below the nose is covered with the liquid, and the outflow stops; this effects a great saving, and reduces the loss so often occurring with unskilled labor.
23. Ulling bottle in inclined position, called *automatic uller* (system of Chaume).
24. Ulling bottle in vertical position, being a bottle with two necks; the lower one is conical, to fill the bunghole; the other one is an ordinary bottle neck, through which the wine destined for ulling is poured; then this bottle is closed with a conical stopper, after fitting to the bung, by wrapping the lower socket with linen or india-rubber; as the barrel gets filled, the wine in the bottle sinks down. The uller (23) is more complicated on account of its inclined position; the air from the barrel being led into the upper part of the bottle through an india-rubber or glass tube, which dips one end into the opening of the bunghole.
25. Z funnel, with stopcock. This instrument renders great services for filling barrels which are placed with the bunghole sidewise.

To facilitate the finding of certain packages, and the making of inventories, each row should bear a number which is inscribed on a board in the great passage, on the wall opposite to the row. This board should show, besides, the date of the entry of the wines, and the quantities which are in each row.

In the cellars of ancient construction, or in buildings which it is impossible to modify, the rows should be laid out in such a way as to utilize in the best way the existing space without interfering with the necessary work around the barrels. At any rate, it would not be prudent to do away with the passages with the object of storing a greater number of barrels; this causes greater loss, particularly if the barrels are badly placed, for, if it would not be possible to inspect them, it would be also impossible to see the leaks, to stop these leaks, and to pump the wine from one barrel into the other when such operations are necessary.

PILING UP CASKS—UTENSILS AND APPARATUS—BORDEAUX METHOD.

The piling up of the casks consists in their stowage on the supports. The casks should be placed firmly so as not to incline forwards or backwards. They are kept in their place by means of blocks of wood shaped in the form of wedges. These blocks are made usually in Bordeaux from clippings of timber employed in the manufacture of barrels; in certain localities in which wood is dear, for instance in Paris, the wooden wedges are replaced by fragments of hard rock.

The barrels which are in the lowest row should rest on four wedges, two in front and two behind, in order to avoid a displacement which would impair the stability of the row, and which would stir up the lees. This would happen without the slightest doubt if the row should be racked in a direction opposite to its placement, and if it should be supported by wedges only from one side. The last barrel in the lowest row should be supported, besides the four usual wedges, by a great triangularly shaped stone, or by a piece of wood of the same shape, which should rest against the bulge. It is important that this last wedge should not go beyond the diameter of the bulge of the barrel; for otherwise one would run the risk in passing through the passages of displacing the wedge and endanger thus the stability of the rows, particularly if they are piled four or five high.

The barrels are piled up to a second, third, and higher rows with the help of wooden bridges. The barrels of these new rows should be supported with blocks with the same care as those of the first row; they are rolled from one end of the row to the other on skids in the same direction as the frames. The skids which are destined for this use are two feet two inches wide (approximately the diameter of the bulge of the Bordeaux barrel), and they are placed without blocks on the barrels which are stored in the first row. Care should be taken that they be firmly bolted together to avoid their spreading. In order that the piling up should be executed quickly, and to diminish the labor of the working man who manages the crowbar, it is necessary, according to the case, that the barrels should arrive on their place either with the bunghole upwards or sidewise.

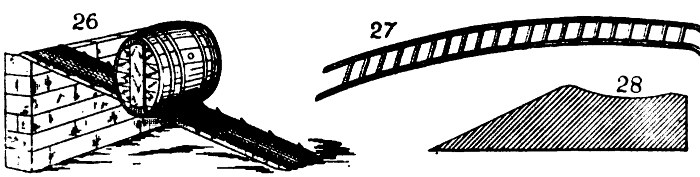
To attain this result they should be measured before hoisting them up.

The utensils and apparatus which are necessary for the piling up of the barrels are: (1) an iron crowbar which is bent on one end and sharpened on the other; this instrument should have a length of two feet eight inches for Bordeaux barrels, and a length of three feet four inches for packages of larger dimensions; (2) blocks of wood and wooden wedges; (3) skids of varying length, from nine to eighteen feet; (4) a hemp rope (one and two tenths inches diameter approximately) about eighty-five feet long, which is chiefly used for piling up the extreme ends of the rows. The bridges are pieces of supports, which should be as straight as possible and free from knots; after having squared the ends, those which have to rest against the barrels are slightly carved out from below so that they are less apt to slip; the other (lower) end of these blocks of wood are also shaped in a way that insures their resting firmly on the soil. These bridges are not united by crossbars; they have a length of twelve to eighteen feet. The handling of the ropes for hoist-

ing the last barrels of a row is managed in a manner best determined by some experience.

For hoisting the barrel, a supplementary workingman (the foreman who has the piling up in charge manages the crowbar) directs the ropes and helps in hoisting; he also receives the barrel when it has arrived to the top row. For taking down a barrel, ropes are equally useful, and the same precautions are needed, particularly for the fourth and fifth rows. For taking a barrel from the second and third rows, it is let down on to skids; or, after having taken away the wedges under the first barrel of the row in front of which a full barrel has been first placed, the barrels are allowed to slide down slowly and with due precaution, helping them with the crowbar and taking care to place between the supports two blocks which rest against the barrels which remain, in order to avoid all violent shocks. But this method requires great experience, to avoid accidents; and it is advisable to use it only in case when a barrel from the second row has to be taken down.

In Bordeaux the piling up of the barrels in rows is generally done by contract, undertaken by men used to this kind of work and who are organized in crews; the simple arrangements which we have just described, though incomplete, sufficiently explain how to carry on the work rapidly. But if this work would have to be done by the coopers, the great firms would have a real advantage in having more complete arrangements, such as are met with in the great warehouses of the north of France. Thus the workingmen could carry out this work with less exertion, and particularly with more security.



SKIDS, HOISTING APPARATUS, BENCHES, ETC.

26. Automatic block skids. This apparatus, constructed by the firm A. Luc, of Paris, has teeth which by an ingenious mechanism fall to the level of the skids as the barrel presses them down, rising to block it when it has passed. It is useful when there is but one man to pile up the casks.
27. Ordinary skids.
28. Inclined plane for decanting with the faucet.

In the following pages we shall undertake to describe these arrangements.

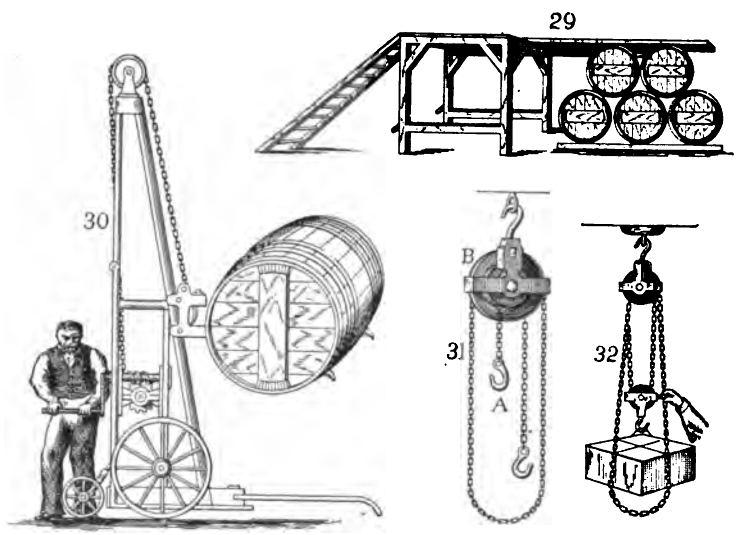
PILING UP BARRELS IN THE WAREHOUSES OF PARIS.

The utensils and apparatus which are used in Paris for piling up the barrels differ very much from those which are used at present in Bordeaux; the pine-wood bridges are replaced by skids; and, besides, a special apparatus called the tabernacle is used. The skids for piling up the casks are joists made from ash, oak, or fir; the best are those which are made of ash wood; they are from five and a half to twenty feet long and about four inches wide, from four and eight tenths to six inches high, and are bound together by flat bars, which are made from oak wood and bent inward; these bars are fitted to the joists at regular intervals of

thirteen inches. The disjoining of the ladder, which is twenty-six inches wide, is prevented by bolts which are placed under the bars at the ends and in the middle of the bar; one end of the skids is provided with double iron hooks so as to prevent it from gliding.

The tabernacle is a strong, solidly built oak table, three and two thirds feet long by two and one third wide, and reaching just to the height of the third row; its height should be regulated according to the height of the supports.

The legs of oak wood are about four inches square, and are connected four inches from the ground by crossbars of the same thickness; the upper part of the legs are connected with the table by four arms of the same thickness. The roof of the tabernacle is planked with oak boards one and a half inches thick. A strip of iron about one fourth of an inch thick, and one and a half inches wide, lines the floor of the tabernacle. This strip of iron is fixed there to receive the hooked irons of the skids (which are placed on one of the narrow sides, in order that the apparatus should have more stability). The tabernacle can be easily transported with the help of iron handles, which are imbedded into the posts.



29. Tabernacle or staging.
30. Windlass for hoisting casks. (Patented by Vernay.)
31. Differential pulley. This pulley is the one commonly employed in foundries and machine shops. One man can easily hoist up a barrel with this pulley.
32. Pulley. (Patent of the firm A. Luc, of Paris.) This pulley, as well as the one mentioned under the preceding number, is transportable and often used for hoisting freight from one story of a building to another.

It can be easily seen that with the help of the rope and of the tabernacle, it is an easy matter to pile up the barrels in all directions, and with security. In order to take down the barrels from the upper rows the same utensils are used, and a bag half filled with straw is placed beneath, in order to deaden the concussion.

Machine for Piling up Barrels.—We have noticed at the last industrial exhibition a machine for piling up barrels, which received the particular attention of the jury—patented machine of Louis Vernay (from Batignolles). We give the design of this machine. (Fig. 30.) It is particularly useful for piling up heavy packages in a limited space and with few workingmen. It consists of a movable platform, which descends to the floor, and on which the package is placed which has to be lifted. This platform rises along an iron shaft of peculiar shape. The ascending movement is imparted by gearing, which a crank, turned by a workingman, sets in motion. When the platform has reached the desired height it is made to turn on a pivot in whatever direction it is desired. By means of a special arrangement the platform can be used as a weighing machine. The machine, which is mounted on rollers, can be easily transported. Notwithstanding, however, the advantages which this machine seems to offer, it is little used, because so expensive; and further, because for the piling up of the ordinary packages in the second row, such as the Bordeaux and Macon barrels, there is required the same and even more time with the help of this machine than by the ordinary processes. This machine is particulary useful for piling up in the fourth and fifth rows. We believe it would render great services in countries where wages are high, and in warehouses where big packages have to be lifted.

Further on are represented the machines which are established on a post, or on pivots, or on rails, and which are used for hoisting weights from one story to another. Several types and models of these machines are used in cellars, such as windlasses, cranes, etc., according to the arrangements of the premises, and according to the necessity to perform the lifting vertically or on the inclined plane. (See Figs. 126 and 127.)

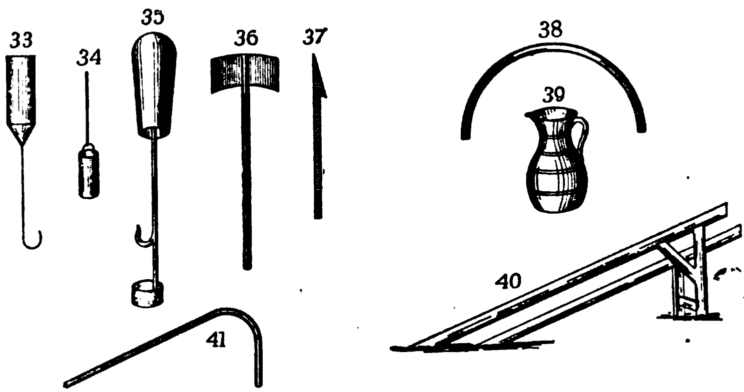
RACKING—UTILITY AND OBJECTS OF RACKING—FAVORABLE CONDITIONS OF TIME AND TEMPERATURE.

The objects of the racking are: 1. To separate the wine from the lees, which have settled on the bottom of the cask, either on standing or after the use of finings. 2. To prevent, or to stop with the help of sulphurous acid, alcoholic or acetic after-fermentations. 3. To replace in the barrels the wine which has evaporated.

The wine should never be allowed to remain long on the lees after it has become bright, either on standing or after the use of finings; because if the lees are not separated from the wine the after-fermentation, or even the simple expansion which is produced by the increase of temperature, brings these lees back in the wine, which in this case loses its brightness, and assumes sometimes a leady and turbid appearance. It has been also observed that the wine, even if it does not lose its bright condition, acquires through long contact with the deposits a disagreeable taste of lees. This sufficiently indicates the importance of racking. We have constantly observed that the wines in general, and the wines under treatment with finings in particular, which have been racked as soon as their brightness was perfect (from fifteen days to a month after treatment with finings, according to the finings which had been used, the construction of the cellar, the character of the wine, etc.), were generally brighter, had a better taste, and were less subject to "working" than the wines which had remained in contact with the finings during six

months (from one racking to the other). The wines which had not been treated with finings, which were turbid, and which had become clear on standing without the aid of artificial means, have behaved in the same way. Those which are racked as soon as they are perfectly clear are of a quality superior to those which are allowed to remain in contact with their lees from one equinox to the other.

We are going to state precisely, in speaking of the treatment of each kind of wine in particular, the reasons which necessitate racking at other than ordinary times. The chief reasons are the "working" of the wine, the expansion, the too rapid evaporation, turbidity, etc.

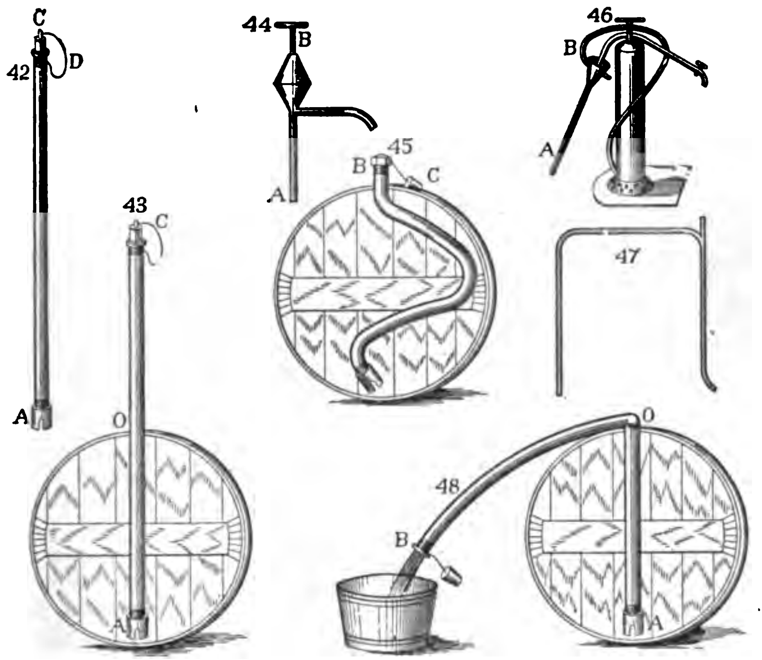


RACKING TOOLS.

33. Sulphur-burner or ordinary wickholder.
34. Cup for collecting the drops of fused sulphur.
35. Improved sulphur-burner.
36. Tilt-hammer or bung-starter.
37. Iron instrument used to assist in bung lifting.
38. Copper tube. This is a siphon, or cast tube of semi-oval form, with an inner diameter of 1 to 1.2 inches.
39. Can measure, of a pattern employed in Bordeaux.
40. Horse for the purpose of decanting.
41. Half siphon (of Sourbé).

The remarks which follow apply only to wines the vinification of which has succeeded well, which are bright, which do not "work," and which are stored in perfectly close cellars; in this case, the young wines are racked four times during their first year; the first racking is done as soon as the wine becomes transparent, and before the after-fermentation is formed; and if it is not immediately filled up the wine undergoes a change; the second racking is effected in March, before the vines form new shoots, during the spring equinox; the third, during the blossoming of the vine in June; and lastly, the fourth, during the autumnal equinox in September. The old wines should be racked twice a year, in the spring and autumnal equinoxes. But we repeat it here, even if the wine has been racked at the ordinary periods, this should not be considered sufficient, if it has undergone changes or a new fermentation. It is also very important to ascertain if the barrels are full; this is very easily done when the barrels are placed with the bunghole upwards; but if they are placed with the bunghole sidewise, it happens often that owing to several reasons, the chief of which are leaks and a too frequent taking out of samples, a considerable empty space is formed.

To perform the ullage, a gimlet hole is bored in the bottom of the barrel near the bulge, and a small Z-shaped funnel introduced; another hole is pierced through the bulge and the wine poured into the funnel until it flows out of the upper gimlet hole; then these holes are closed, and the stopcock and funnel removed. This operation should be repeated every time when samples have been taken out of the barrel, and in cellars in which the loss by evaporation is considerable in the intervals between the rackings. It is preferable to rack in dry weather, when the wind blows from the north or from the east, and when the moon is decreasing, rather than in rainy weather with south or west winds and when the moon is increasing. For it should be known that



PUMPS AND SIPHONS.

42. Siphon made from india-rubber. This siphon contains a metallic spiral, which keeps it hollow while bent; the lower part, *a*, is provided with an indented tube, in order to facilitate the introduction of the liquid; a second metallic tube, *b*, is fastened to the other end of the india-rubber hose. This tube can be closed by an india-rubber stopper, *c*, which is tied to the hose by the string, *d*. The inner diameter of the siphon is about 0.8 inches. In order to use it, it is introduced open in the full barrel (compare Fig. 45); it bends in *cc* and *c'c'* and fills; the india-rubber stopper is now introduced, and then the hose is lifted vertically, as shown in Fig. 43. By bending it appears in the manner shown in Fig. 48; a vessel is placed under the stopper, which is now taken out; the liquid runs out without the necessity of the tube, as in the case of ordinary siphons.
43. Compare description in 42.
44. Hand pump. The lower rod *a* of this pump has a length corresponding to the depth of the casks with which it has to be used; it is also possible to connect it by means of an india-rubber tube with a movable rod, which can be made longer or shorter, according to necessity. This pump is particularly useful when the liquid has to be drawn from a partly filled cask.
45. Compare description in 42.
46. Planchon pump. This is a compressed air pump described in the text. The rod *a* is introduced into the barrel; *b* fits the bunghole.
47. Siphon of trapeze-form, with tube for carrying a candle.
48. Compare description in 42.

hot and moist winds impart to the liquids an expanding movement, which is apt to disturb the lees. Cold and dry winds exercise, on the contrary, a certain contracting influence by lowering the temperature. The phases of the moon seem to have, also, an influence on the expansion.

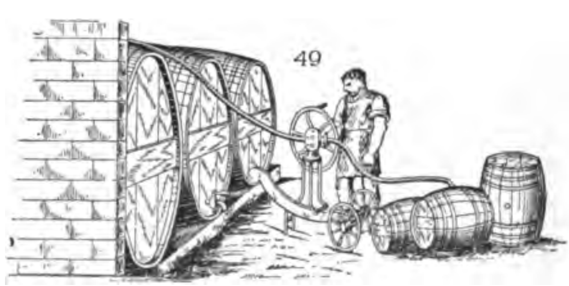
The racking and the pumping over of the wine should be performed sheltered from the direct contact with the air; care should also be taken to burn a piece of sulphur wick in the empty barrels which are intended to contain the liquid, in order to neutralize the oxygen of the air which they contain by means of the sulphurous acid. If the racking is done, the air being allowed to have free access, and without burning sulphur, not only a portion of the bouquet and of the alcohol are liable to evaporate, but also the danger is present that the wine may ferment anew.

HOW TO DO THE RACKING—METHOD USED IN BORDEAUX.—According to this method the wine in the barrels of the lowest and second rows is racked so that the immediate contact with the air is avoided; the wine which is contained in the barrels of the third, fourth, and fifth rows is exposed to the air only for a moment on entering the funnel. However, it is sometimes possible to avoid this contact by making the tubes dip into the funnel.

The utensils necessary for racking, whose description and pictures we have given, are the small adz, a fine smooth glass, a bung-starter and bung-screw, two or three brass stopcocks with straight socket, a wooden basin, two heart-shaped buckets, called bassiots, a specially constructed bellows, air force pump, two wooden funnels and a can, wooden tubs of various shapes and dimensions; one for the barrels of the first row, one for those of the second row, and one for the third, fourth, and fifth rows. The remaining tools are shown in the illustrations.

When the passages are very narrow the racking is done without the empty barrels being placed in the passages, for which a hose or long tube is necessary.

In order to rack the barrels of the first row, if they are placed with the bungholes upwards, the cock is placed as follows: After having wound a strip of linen round the stopcock, a hole is bored with the



49. Rotary pump specially designed for filling and emptying large casks.

auger, or, if a hole has been made already, before the plug is removed, and the stopcock inserted with some slight knocks of the mallet; then connect with the empty barrel which is destined to hold the wine. Around the ends of the wooden tube are wound strips of linen; one end is then inserted in the nozzle of the stopcock, and the other in the hose con-

necting with the empty barrel, which is placed in equilibrium by wooden blocks.

If the bung is removed it should be taken out with the help of the chisel or bung-screw. In no case should the tilt-hammer be used before racking, neither should the staves be cut or hammered, for that might cause the lees to rise in the wine. For the same reason we should avoid imparting any shocks to the rows of barrels.

The stopcock once open, the wine runs without coming in contact with the external air from one barrel into the other until the liquid has reached the same level in both. Now the bellows are placed on the barrel which is to be emptied and fastened to it by means of a hook. By blowing into the first barrel the air is compressed, and the wine forced to pass into the empty barrel.

When it has reached the level of the stopcock, a certain noise, a *glou-glou*, which is produced by the air which enters between the stopcock and the wooden tube, can be heard. Then the stopcock is closed, the bellows taken down, and the full barrel is bunged. Then the end of the tube which is in the stopcock is taken out, a little wine runs in the basin, and as soon as the air begins to enter the tube the other end is taken out, and the plug replaced; the tube drains into the bucket. After that the bung is taken out, and a funnel is placed on the barrel, which is not yet entirely filled. The stopcock is opened now, and the barrel which has been racked is lifted in order to get out of it all the clear wine which is collected in the basin. The lifting is done by a second workingman with the hands, or, still better, with the help of a crowbar, or of a jackscrew, but always without concussions or rapid movements. As soon as the wine begins to be turbid, which can be ascertained with the help of a candle, or of a tumbler, which is made of fine glass, the stopcock is closed, and the wine which is in the basin poured into the barrel. Instead of a fine glass, a silver cup may be used, but the condition of the wine is not so well recognized in it.

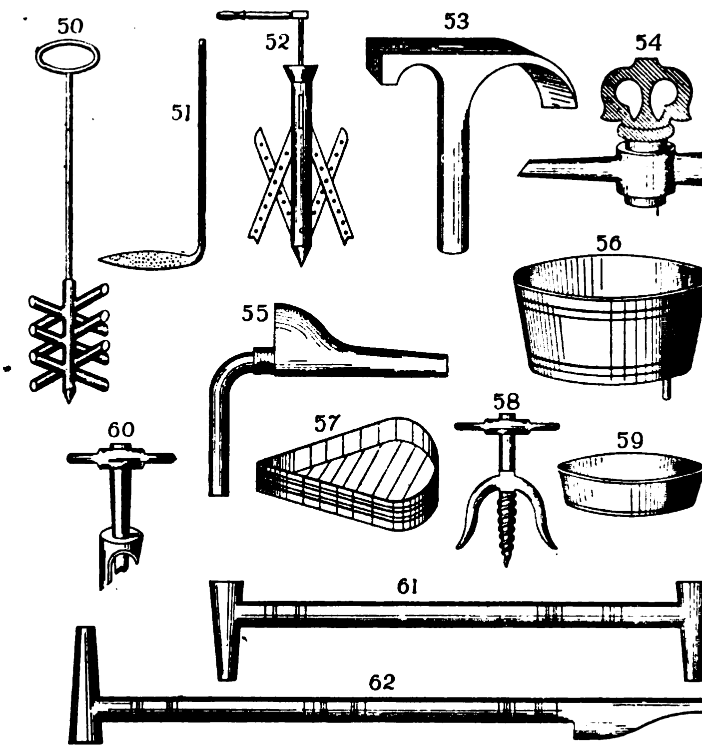
Lastly, the stopcock is taken out, and a plug inserted into the racked barrel, from which the lees are to be immediately removed.

The plugs are covered with cloth in order to close exactly any unevennesses made by the removal of the same, and to render them easily taken out at the following rackings.

The racking of the barrels in the second, third, fourth, and fifth rows is much simpler. For the second row, after having made a hole in the barrel and introduced the stopcock (always with the bucket below, and with the same precautions as for the barrels of the first row), the empty barrel is placed below. One of the ends of the wooden tube, which is called *dogshead* (see Fig. 55), is introduced in the bunghole of the empty barrel, and the other end, around which a strip of linen is wound, enters the stopcock hole of the barrel to be decanted. When the liquid has run out the tube is taken out and the barrel which has been racked is moved aside. Then a bucket with a funnel is placed under the stopcock to receive the residue of the wine in the barrel. For the barrels of the third, fourth, and fifth rows the tubes enter directly the funnels which are placed on the empty barrels, and the lifting of the barrels for emptying the residue of the liquid is done without moving them.

Cleanliness.—The empty barrels which are destined to be filled should be rinsed until the wash-water has no more color; if the lees are greasy

the barrels are rinsed several times with a good quantity of water. They should not be sulphured until the wash-water has been well drained off



UTENSILS USED IN WORKING (*foulage*) AND RACKING WINES.

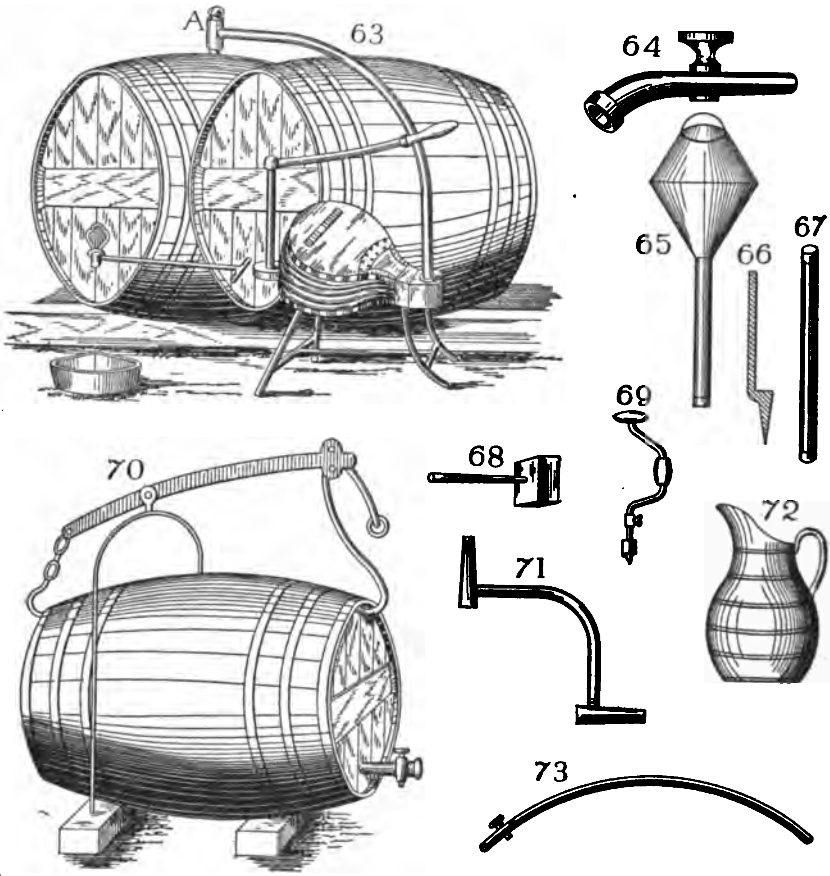
50. Stirrer (Bordelaise).
51. *Dodine*. This instrument, as well as that which is described under the following number, is used most frequently for working and mixing the finings in large casks, barrels, and tanks.
52. Stirrer (Barignan). This apparatus is introduced (being closed) through the bung-hole. Its arms are afterwards opened by simple pressure; the stirring is produced by simple rotary movement; it then closes like an umbrella.
53. Adz. This is one of the most useful of cellar instruments.
54. Racking stopcock (Bordeaux style), with straight socket.
55. Dogshead (compare *racking* as practiced in Bordeaux, and described above).
56. Racking funnel. Several kinds are used with simple outlet and with automatic arrangements which stop the outflow as soon as the barrel is full. Their use is not a very common one, because the mechanism is liable to get out of order or the large dimensions of their sockets make their handling inconvenient. However, if the racking and filling up has to be done by poorly skilled workingmen, this kind of funnel renders great service.
57. Heart-shaped filling tub.
58. Plug drawer or bung-screw.
59. Wooden basin used in racking.
60. Auger (wimble). Several patterns are met with in the trade; thus, this one is used simply to round out the bungholes, which have already been made, and to remove the unevenness. Then there are the ancient augers with conical blade. The modern augers have a kind of English screw, which pierce a cylindrical hole of smaller diameter than that of the bunghole or gimlet hole; above this screw is a conical socket with blades to take out the unevennesses and enlarge the aperture made by the gimlet end.
61. Is a wooden tube, and composed of three parts. These three parts are united or held together with leather strips indicated on the drawing.
62. Same as the above. Its construction differs from that of the foregoing only in this respect, that one of its ends is straight.

and just before filling, otherwise the water which is adhering to the staves would become impregnated with sulphurous acid and would communicate to the wine a disagreeable taste of sulphur, which would not disappear for many days. The tools and utensils used for racking should be cleaned and rinsed with plenty of water every day, and when not in use they should be always placed so as to dry, otherwise the adhering wine would soon become acid, and thereby injure the wine with which these instruments are brought in contact. The tubes should be taken to pieces and the lees which stick to their inner walls should be scraped off with bottle brushes which are fastened to long iron rods. This cleaning should be done every week in a well kept cellar. The wine which drops from the leaks and which falls in the bucket should be poured on the lees and not in the wine which has been racked. The basin should not commonly be placed on the dirty floor of the cellar; it should be put on blocks of wood, in order to prevent contamination with earth and dust.

MACON METHOD OF RACKING (used in the warehouses of Paris).—Necessary utensils: An *ascette* or small adz, centerbit wimble, which is provided with a screw of the diameter of the spigot-holes, two or three copper faucets bent round of a shape which is called *Maconnaise* (Fig. 64), two heart-shaped buckets, one basin, two wooden funnels, a wooden hammer, two wooden jugs of a capacity from three to three and a half gallons, two tin tubes which can be joined with the faucets and which can be lengthened or shortened, according to necessity, their ends fitting in each other, a small jackscrew, a silver cup, a gimlet, and spigots.

In order to rack barrels of the first row a heart-shaped bucket is placed under the barrel, in which a hole is made with the centerbit wimble; if there has already been a hole made, the plug is removed. If the barrel is placed with the bunghole sidewise, several gimlet holes are also made in the upper stave in order to let in air, and with the help of the wooden hammer the faucet is driven in. Below the faucet one of the jugs is placed. The empty barrel is now brought in the proper distance, made firm with the help of wooden blocks, and a funnel placed in it. Now the faucet is opened, and, changing the jugs quickly, we avoid closing it every time, which is apt to disturb the lees; the jugs are emptied in the funnel, and when the barrel has to be lifted the remainder is emptied either into the heart-shaped bucket or into a basin. The clear condition of the wine can be ascertained with the help of an embossed silver cup, but a wine which appears transparent in the cup may be found to be turbid if looked at by candle light in a fine and smooth glass. After racking the faucet is taken out and a spigot is inserted.

The barrels of the second row are racked by connecting the end of the tube with the Maconnaise faucet. The third, fourth, and fifth rows run out directly through the tube, which is lengthened according to necessity in the funnel, then, as in the Bordeaux method, there is no necessity of moving the barrels from their place. This system of racking has the objection of making the wine in the barrels of the first row flat, by being racked off jug after jug. The same inconvenience occurs, though in a less degree, for the upper rows. The tubes do not join the faucets tightly, and can only be placed vertically, while the wooden tubes of the Bordeaux pattern can be placed in inclined positions, which allow us, if



TOOLS FOR RACKING AND BLENDING.

63. Racking bellows (Bordeaux fashion). The liquid in the two barrels being on the same level, the socket of the bellows is introduced through the bunghole *a*; by blowing a pressure is exercised on the wine to be racked, causing it to pass from the barrel *a* into the other barrel.
64. Stopcock for racking (pattern used in Macon).
65. Racking funnel (Macon method). Arranged such that it can be hung to the projecting flange of the bent stopcock of the preceding number.
66. Chisel for taking out the spigots (Maconnaise method). Instead of using a plug screw to bore out the spigot, a part is taken out with the help of this chisel, and what remains of it is driven back with the end of the stopcock, which is forced in later with the help of the mallet, No. 68.
67. Piece of pipe, made to fit and extend the tube described in No. 65.
68. Maconnaise mallet.
69. Ordinary centerbit wimble. It is fitted with an English bit of adjustable diameter.
70. Screwjack for the purposes of racking, system Viver.
71. Flexible tube (patent Kehrig). This is an india-rubber tube, with metallic spiral in the interior, which keeps it open at various angles.
72. Maconnaise jug. Capacity, half a gallon to four gallons.
73. Automatic siphon. This is an india-rubber tube, which contains, like the tube, No. 71, and the siphon, No. 42, a metallic spiral, which prevents its closing when it is bent. It is provided with a straight and very short stopcock; it is filled by introducing the open end through the bung of the barrel; then the stopcock is turned, and the tube whose end is kept below the level of the liquid is bent; it is sufficient to open the stopcock to start the outflow.

necessary, to rack from the end of the rows without placing the barrels in the passages.

As far as the rapidity of the work is concerned, workingmen who are familiar with either of these methods will be able to do approximately the same amount of work in the same time.

PUMPING THE WINE FROM ONE BARREL INTO THE OTHER—VARIOUS SYSTEMS OF PUMPS, OF SIPHONS, ETC., FOR RACKING.—There are several kinds of pumps and siphons which are specially designed for use in the wine cellar, but none of them fulfills the desired aim, viz.: to extract the whole liquid portion without producing a turbidity through the rising of the lees (avoiding at the same time the contact with the air), and without imparting concussions to the full barrels; and without leaving in them too much of the lees, whether they be in the first or in the upper rows.

FAUCET.—in order to transfer the liquid from one barrel to the other by means of the faucet (or racking stopcock), it is necessary to pile them up, to draw them up an inclined plane, or to place them on supports such that we may be able to place below, either empty barrels or vessels, jugs, basins, etc.

SUCTION PUMP.—The ordinary tin or copper pumps cannot be used for racking, for they would make the lees rise, unless a valve is adapted to the lower end, which would regulate the inflow of the liquid and would leave the lees during the suction far below its level; but they can be very useful for emptying barrels with the bungholes upwards in narrow passages where siphons cannot be used. These pumps can also be used with viscous or disagreeably smelling liquids, such as oils, vinegar, alcohol, etc.

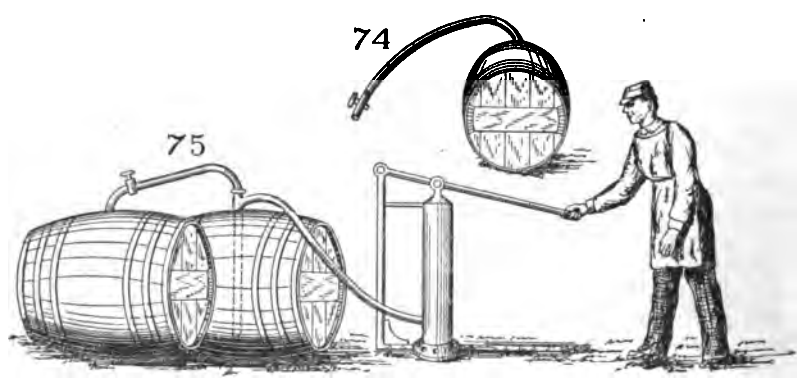
SUCTION AND FORCE PUMP.—This pump, which is constructed after the principles of the fire engine or spray pump, cannot be used for racking unless a special appliance is attached to them with a plunge tube. Already for several years rotary and centrifugal pumps have been used provided with faucet tubes and accessories, which make it possible to use them in the wine cellar. They are used particularly in the south of France. We shall have an opportunity to examine them in describing the new utensils.

COMPRESSED AIR PUMP.—This pump, which the inventor calls wrongly "*pneumatic apparatus,*" is used profitably when liquids have to be transferred and the contact with the air has to be avoided. With a slight modification, which consists of replacing the inner tube by a simple cork, this pump is suited to replace the racking bellows. Its construction is founded on the fact that the air compressed in a closed vessel can drive out by the pressure the liquid which is in this vessel if a tube communicates from this liquid with the surrounding air or other open package.

The action of the pump is analogous to that of the bellows used for racking the barrels in the lowest row. This kind of pump can be profitably used for pumping wines, and particularly alcohol, vinegar, etc., in casks. The full casks should be in good condition; should they have leaks the compressed air would either increase the leakage or entirely

whistle out. To use this pump, the needle which is at the end of the tube is so gauged as to leave a couple of gallons of liquid in the barrel. The movement of the piston should be stopped as soon as the air begins to enter the tube; without this precaution the lees would be stirred up. If it should be necessary to obtain a perfectly clear liquid, much wine would have to be left in the barrels. As we have already said, this pump has a movable tube provided at its end with a needle, which is equally movable. This tube is placed in the interior of the cask, whose bunghole is hermetically closed by a kind of casing containing two holes; one of these holes is used as a conduit for the wine with the help of a copper tube which tightly joins the movable tube, and whose end is provided with a stopcock. The second opening has no inner tube, but connects with the bellows or pump by means of a flexible tube and introduces the compressed air into the barrel.

The length of the needle which is adjusted to the inner tube, is regulated according to the quantity of the lees which are presumed to be in the barrel, after which the pump will not work lower than the desired level; it follows that all the barrels are racked to the same level, whatever may be the quantity of lees which they contain; by this means we may either leave too much or carry off a portion of the wine, and the racking is done somewhat blindly. Then, besides that drawback, the lees may be stirred up and mixed with the wine through the introduction of the tube. One is not sure, therefore, of racking off a clear liquid unless much more lees are left in the cask than may be necessary.



74. Automatic siphon, ready for working.
75. Laburthe pump. This pump works on the same principle as the air force pump shown in Fig. 63.

There exists another system of pneumatic pumps, which, by producing a vacuum in the barrel to be filled, suck in the liquid from the full barrel. The liquid in the latter is driven out by atmospheric pressure. This system does not offer the advantages of the force pump or of the bellows.

SIPHONS.—Several kinds of siphons, made from tin, glass, and copper, are manufactured. The simplest and that most commonly used in the trade are semi-oval or trapeze-shaped tubes. Some are made with a double tube. (Fig. 47.) In order to use them the end is closed, and the liquid sucked slowly up till it fills the tube which is parallel to the great bend. This is a convenient instrument in the hands of people

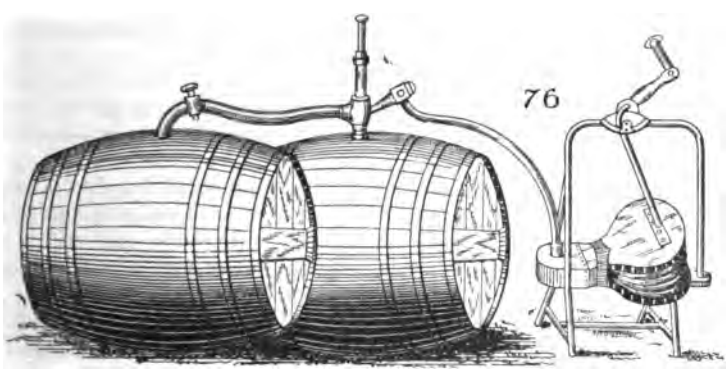
who are not accustomed to the handling of a siphon, and who do not care to suck the end of the siphon direct.

Certain siphons are provided at the end of their great bend with a small stopcock, after the manner of a damper used in stove-pipes. With this kind of siphon it is possible to avoid repeated sucking. There are also made half siphons with short bends. They come very handy sometimes, for instance in testing wines, etc.

The kind of siphon which accelerates in the most effective manner the work, is the copper tube simply bent to a half circle. These tubes are made of various calibers, according to the diameter of the bungholes. A certain experience is necessary in the use of these tubes, but if one knows how to handle them they offer, like the half siphons, great advantages compared with all the above mentioned instruments.

Neither the siphons nor the tubes which we have just mentioned can be used for the racking of wines, because they are apt to carry with the wine some small particles of the lees if they are sunk too deep in the casks. If, on the contrary, they are not sunk in sufficiently deep, there remains too much with the lees in the cask. But they are a great help in the simple transferring of wine from one barrel to another.

The transferring of wine from one barrel to another by means of a semi-circular tube may be done rapidly without exposing the wine to the contact of the air. This is done by lifting the full barrel onto a wooden *horse* (Fig. 40), consisting of an inclined plane ten feet long, two and



.76. Racking pump (Viver system). This apparatus is used for racking and decanting wines, and are like the compressed air pumps (Planchon and Laburthe) which have been already described. Besides this, it is used to measure automatically; that is to control the quantity of liquid to be taken out of the barrels, either for equalizing the contents or for blending. A movable vertical tube, which is graduated, reaches into the barrel; the numbers which are marked on the tube correspond to the quantity of liquor which has to be taken out; when this level is reached the introduction of air stops the outflow. This apparatus is fitted with a newly patented rotary blower.

one half feet high, and two and one quarter feet wide. It is framed from pine wood, two 3x5 joists, which are bound together by two cross-pieces. The supports are placed one foot from the end, in order to facilitate the rolling forward of the packages for draining them. These supports have two cross-pieces and two braces well mortised into the uprights, which with the cross-pieces bind the joist with the support which is nearest. The dimensions which we have given are those of a barrel-horse. The horse which is used for larger packages is eleven and

two thirds feet long, and two and two thirds feet high; the joists are four inches wide and five inches high.

The full barrel when once lifted is kept in its place by a triangular cross-piece, and the empty barrel is rolled in front of the horse, blocked securely, and the bung taken out. The bung is now taken out of the full barrel, and one of the ends of the semi-circular tube introduced into the bunghole; the other end is sucked and quickly put in through the bunghole of the empty barrel. The wine will rapidly run from one barrel into the other, and its outflow may be facilitated by lifting gradually the full barrel towards the empty barrel until the whole contents of one have run out into the other; the residue of the liquid is emptied with the help of a can and funnel.

Sometimes the contents of a full barrel, particularly if it is a large one, are transferred without the barrel being lifted onto the horse, but always with the help of the semi-circular tube. For this purpose an empty and a full barrel are placed side by side; after having taken the bungs out, the tube is introduced into the full barrel, then filled by suction, and quickly brought into the bunghole of the empty barrel. The wine now flows from one barrel into the other until it has reached the same level in both; the emptying of the barrel is then completed by lifting the partly filled barrel onto the horse. This method can be used advantageously in the "half-and-half" blending operations.

With siphons it is also possible to transfer the wine by the aid of cans and jugs, from which the wine is poured into the empty barrels; but this method is less rapid and has the objection of making the wines flat—particularly the fine wines.

To sum up what we have said, the best methods for racking are those which preserve the wine in the most effective way from contact with the air. Such is the Bordeaux method, which is used in some parts of Burgundy as well as in Bordeaux.

The same remarks can be applied to the process of simply transferring wine from one barrel to another, and for the same reasons the transfers by means of the pump, or the half siphon, or the compressed air pump, or the rotary pump, for casks of great dimensions and perhaps in poor condition, are preferable.

SULPHUROUS ACID GAS; ITS NATURE; PROPERTIES; USE IN THE TREATMENT OF WINES—SULPHUR WICKS; THEIR MANUFACTURE, ETC.—Sulphurous acid gas is the product of the combustion of sulphur; it is nothing but the smoke of this combustion; composed of one part of sulphur and two parts of oxygen. The specific gravity of this gas is greater than that of the air. In the gaseous state, sulphurous acid gas is miscible with water. The latter can absorb several times its own volume of the gas. It neutralizes the oxygen of the air and possesses also the property of changing or destroying a great number of organic colors.

This acid can also be used for the conservation of food, be it vegetables or meats, by keeping these substances in hermetically sealed vessels, in which sulphur has been previously burned. The quantity of sulphur used should be proportional to the dimensions of the vessel; the combustion stops on its own account as soon as all of the oxygen is used up.

These properties of sulphurous acid have been utilized since time immemorial for the purposes of vinification and that of conserving barrels and casks. For the different uses to which it is applied, the

sulphur should be free from all admixtures. It is used for the following purposes:

(1) To prevent the must from fermenting, by which means are made what are called unfermented wines.

(2) To stop the first violent fermentation, when it has already begun, or to prevent and stop the alcoholic after-fermentation.

(3) To prevent the wines from becoming acid, moldy, or flattish, through contact with air, when the barrels are not quite full.

(4) To preserve in a good state the empty barrels, and to prevent the moldiness and acidity which are liable to develop in the interior of the casks.

(5) Lastly, to redden and make more flexible the wicker which is used for the hoops.

In the various operations which we are going to describe, wicks impregnated with sulphur are used. These wicks are strips of linen which have been dipped several times into molten sulphur, according to the thickness which it is intended to give to the coating. It is advisable to use wicks rather with a thick coating of sulphur than with a thin one, particularly for the purpose of treating wines, because the combustion and carbonization of too much linen may communicate a disagreeable taste.

If the wine maker resides far from the great manufacturing centers, he may easily manufacture the sulphur wicks; the operation is very simple: In a suitable dish the sulphur is fused on a slow fire, and strips of thin linen 12 inches long by 0.8 to 1.2 inches wide are steeped repeatedly in the melted mass, until a coating of sufficient thickness is obtained.

Nowadays flower of sulphur (purified sublimed sulphur) is to be found at all the druggists of wine-growing countries. By the use of this kind of sulphur better wicks will be obtained than those which are made with impure crystals. In order that the wicks may be of a fine yellow color, the sulphur should be fused on a very moderate fire and the temperature raised gradually. It fuses at 228 degrees Fahrenheit. For this operation a large and flat stewpan is more convenient than a deep vessel. A partition perforated with holes or open at the bottom is soldered in the middle of the pan, thus forming two compartments. The flower of sulphur is placed in one of them, and the fused sulphur runs into the other. As soon as the sulphur is fused, the strips of linen are soaked in it, and turned from one side to the other by holding them at one end with pinchers. The wick is now allowed to drain for a few minutes by holding it vertically above the pan, and then it is placed horizontally on a large board near the stove. The wicks cool off very suddenly, and thus the board is covered with them. Afterwards the first wick is taken and soaked again in the sulphur, and so on, until a layer of sulphur of the desired thickness is obtained.

In order that these wicks should burn easily in the barrels, they are suspended by an instrument which consists of a wire whose one end is bended to the shape of a hook, and whose other end is fitted into a cylindro-conical wooden handle which closes the bunghole hermetically. (Figs. 33–4–5.)

Practical Method of Stopping the Fermentation of the Must.—This operation is most frequently performed with the musts from white grapes a short time after they have been pressed. The grapes are gathered with

care, stemmed, and crushed in the ordinary way. Then the must is separated from the bulk of the lees. This is done by pouring the must from the press into a vat or pipe. The must becomes clear on standing, but it is important to draw it off before the fermentation begins. The starting of the latter is indicated by numerous bubbles of carbonic acid which rise to the surface. It is necessary to wait eight or twelve hours to obtain a clear must. Sometimes even the must has to be watched during the night if it is considered important that it should be clear; for as soon as the fermentation starts the must becomes turbid.

Unfermented wines, or preserved musts, are used to communicate sweetness to the new wines which show a deficiency in this respect; for making concentrated must, if it is not possible to carry out the concentration on the spot; or for the preparation of certain sweet wines. To make unfermented wine in the right way, the must should be previously freed from the fragments of skins, of the seeds, etc., which it contains. For this purpose a peculiar wicker basket, with very small meshes, is placed below the opening of the press, and thus a part of the impurities remains in the basket. The same end is attained by using an ordinary basket, whose bottom and walls are covered with several layers of intertwisted straw. The casks which are destined to hold unfermented wines are previously rinsed with boiling water, then with cold water, and carefully drained.

The fermentation of the must can be prevented in two ways. The following is one of them: In an empty barrel two squares of sulphur wick, more or less, according to the thickness of the layer of sulphur, are burned, but always enough to use up all the oxygen present. Then the must is rapidly filled into the barrel, so as to make it half full; the barrel is now bunged as firmly as possible, and rolled and moved in all directions, to allow the sulphurous acid gas to become well absorbed by the must. This must is then transferred (protecting it all the time from contact with the air) into another barrel, which has been sulphured in the same manner, and which is bunged, rolled, and moved in its turn just as was the first one. During this time sulphur is burned again in the first barrel, which has been emptied and the must transferred back to it again; the barrel is again moved about and rolled, and its contents transferred into another sulphured barrel, which is bunged and treated in the same manner as the other barrels. This must has been therefore treated four times with sulphurous acid gas. The barrel is now completely filled with other must, which has been treated in the same manner, and solidly bunged.

In performing these operations, contact with the air should be avoided as much as possible.

Another method of preventing the fermentation of the must is given in the following: A square of sulphur wick, representing about one and a half ounces of sulphur, is burned in an empty barrel; then five gallons of must are poured into the barrel, which is hermetically bunged and rolled; after some time the bunghole is opened, and an attempt is made to burn a second wick, but if the oxygen of the air has been used up by the combustion of the first wick, it is necessary to renew the air in the barrel, which may be done with the help of a pair of ordinary kitchen bellows. When the second wick is burned, five more gallons of must are added, the barrel bunged, and again rolled and shaken. This same operation is repeated until only five gallons more of must are required

to fill the barrel. These last five gallons are treated separately with sulphurous acid in another barrel, and then poured into the cask to fill it completely; after that the barrel is definitely bunged.

Classification of the Preserved Musts—How to Treat Them.—They should be filled into strong barrels, which are solidly hooped with iron and firmly bunged. The barrels should always be placed with the bunghole upward, and in air-tight cellars whose temperature is constant. They should be kept well filled by making up the loss from evaporation every five days with preserved must; these musts should be also frequently racked, in order to free them from sediments and from the ferments which they contain. In racking, avoid contact with the air as much as possible, and use barrels which have been thoroughly sulphured. A complete clearing is obtained by introducing in the must before treatment with sulphurous acid about three quarters of an ounce of tannin per barrel (alcoholic tannin solution is mostly used), and by pouring into the barrel, before filling completely, a cold solution of two tablets of gelatine in one pint of water. The treatment with sulphurous acid partly discolors the musts. To prevent the fermentation of the must, some chemists have proposed to use, instead of sulphurous acid gas, sulphite of lime, sulphuric acid, carbonate of iron, evaporation in vacuum pans, etc.; but these different processes are generally more expensive than the use of sulphur, or possess the objection of imparting a foreign taste to the musts. Up to the present there has not been found an easy and economical method for the above, the use of which does not impart a foreign taste to the wines, and which could profitably replace sulphurous acid gas. Here I must remark that musts can be also preserved, without fermentation, by fortifying them to an alcoholic strength of 15 per cent of alcohol.

Method of Stopping the First Violent Fermentation.—To stop the violent fermentation of white wines, they should be racked and poured into barrels which are more or less sulphured, according to the degree of violence which the fermentation has reached. As far as the red wines are concerned, great cautiousness should be exercised in using sulphur, if it is either desired to prevent the after-fermentation or the access of the air during racking, for the sulphurous acid precipitates a part of the coloring matter, particularly in the case of ordinary wines which are low in alcohol and tannin. Only when the fermentation is very violent is it advisable to thoroughly sulphur the empty barrels destined to hold them; under ordinary circumstances, it is sufficient to burn a small quantity of sulphur, particularly when the wine is in its first year; a still smaller quantity will answer when it is in its second year.

Partly Filled Barrels.—In order to prevent the wine from becoming sour and moldy when the barrels are only partly filled, it is sufficient to burn a piece of sulphur wick in the barrel and to bung hermetically. This operation is repeated every time the bung is taken out, and at least every fortnight, if the barrel has to remain bunged for a long time. It is advisable to avoid as much as possible leaving the barrels partly filled, because in the end the sulphurous acid communicates to the wines a disagreeable taste, which disappears only after a long time. It is possible to sulphur a partly filled barrel without taking out the bung. For this purpose it is sufficient to bore a gimlet hole in the upper part of the bottom, and to hold at this opening a sulphur wick every time

when the wine is drawn off by the stopcock. The air, in rushing in through the gimlet hole, draws in the sulphur vapor; afterwards a plug is introduced in the gimlet hole.

Keeping the Empty Barrels.—In order to preserve the empty barrels in good condition, it is necessary to rinse them with plenty of water when they are dirty, and to burn some sulphur in them, and let them drain for some hours; they should be, also, solidly hooped and bunged. By burning in the barrel (after a first treatment with sulphurous acid and a complete draining) three squares of sulphurous wick, and by bunging hermetically afterwards, moldiness, acidity, etc., are avoided. It is possible to burn the sulphur without using a hook, simply by cutting the sulphur wick into long strips and removing the sulphur from one of the ends, by which it is suspended from the bunghole by bunging the barrel after having lighted the other end.

Making the Wicker Flexible.—To redden the wicker and to make it flexible, it is sufficient, after having moistened and drained it, to expose it to the sulphur vapors in a barrel whose bottom has been taken out, and which is covered carefully in order that the vapors should not escape.

CHAPTER II.

CLARIFYING WINES.

Preliminary remarks. Various finings; their application. Finings which exercise a mechanical action; filtration. Alkaline finings. Albuminous finings; fresh white of egg. Albuminous substances which are not entirely coagulated; fresh or dried blood. Gelatinous substances; gelatin. Various other substances which are used for purposes of fining. Decoction of animal sinews. Recapitulation; the best finings.

Preliminary Remarks.—Wines become turbid and lose their brightness owing to several causes, chief of which are: 1. The after-fermentation or the "working," which impairs the brightness of the wine by keeping in suspension the insoluble matters which, on settling, gradually form the lees. This latter is composed of different salts, ferments, mucilaginous substances, and of the insoluble coloring matter. 2. The expansion which is produced by the rising of temperature. 3. The motion which the wine undergoes during transportation. 4. The blending together of several wines, which renders insoluble and precipitates a part of the coloring matter, and often produces salts equally insoluble. 5. The deficiency in vegetable albumen and tannin, which should be present in order that the matters which become insoluble should be precipitated with the lees.

The fining of wines can be performed in various manners, either by allowing Nature to do the work, or, artificially, by the different methods of fining, the details of which are given below.

The wine becomes clear simply on standing and on being racked from time to time, if the grapes from which it was made were ripe, if the vinification was effected under favorable conditions, if the young wine was carefully treated after the first rackings, and last, not least, if the cellar in which it was stored answered its purpose. Under such conditions, perfectly bright wines can ordinarily be obtained without the help of artificial means.

Before discussing the different methods of fining, we will say that, though it is very important to fine turbid wines on account of the coloring matter, the ferments and the salts which they keep in suspension and which impart to them a common taste and make them liable to undergo an after-fermentation, it is also desirable to avoid the too often use of artificial methods of fining. For by these operations not only the insoluble matters which are in suspension are precipitated, but also the different preserving elements of the wine, which otherwise would not become insoluble, excepting after a very long time. These latter substances are tannin, the various mucilaginous substances, and the pectine, which impart to the wine the mellow and fruity taste and the oily consistency. The repeated treatments with finings affect these qualities and destroy them in the end; they make the wine dry, and thus remove that which imparts, particularly to the first-class wines, their principal value. To prove this assertion we can state that we have always noticed that well made and properly treated wines which cleared perfectly after standing some time—judicious racking only having been applied, but no artificial fining—are superior in every respect to those which have repeatedly undergone an artificial treatment; they possess also more fruity taste, are more oily, and show more color.

It is, therefore, not advisable to apply finings, particularly in the case of first-class wines, excepting when a perfectly bright condition cannot be obtained by natural means. It is never advisable to apply artificial means, unless it is absolutely necessary; and it is important to find among them substances which are able to clear the wine perfectly without altering the color and the taste; these substances should likewise possess the property of not leaving in the liquid any soluble residue, and they should exercise their action by rendering insoluble as little matter as possible.

The substances commonly used in fining wines can be divided into six classes, according to the difference in their action; this action can be purely mechanical, or may give rise to some chemical reaction; it may be the coagulation by alcohol or tannin, or the neutralization of the tartaric and acetic acids, etc.; it may also consist in a partial solution of certain substances in the wine.

1. Substances which exercise but a simple mechanical action without leaving in the wine a soluble residue: unsized gray paper, reduced to a pulp, fine and siliceous sand, filtration through a strainer, etc.

2. Alkaline substances which exercise a mechanical and chemical action by neutralizing a part of the acids contained in the wine, and by forming with them soluble salts, calcined and pulverized pebbles, calcined oyster shells, pulverized marble, pulverized chalk, calcined magnesia, etc.

3. Albuminous substances which exercise a chemical and a mechanical action, and which are mainly coagulated by alcohol and in a less degree by tannin, without leaving in the wine a soluble residue: pure albumen (fresh white of eggs).

4. Gelatinous substances which exercise a chemical and a mechanical action; they are precipitated chiefly by the tannin which is contained in the wine, and do not leave soluble residues, as gelatine, isinglass.

5. Albuminous substances which are not entirely coagulated by alcohol, and a part of which remains dissolved in the wine: fresh or dried blood, milk.

6. Various gelatinous, viscid, or gummy substances, which are not entirely coagulated and precipitated by tannin and alcohol, and a portion of which remain dissolved in the wine: a decoction of animal sinews, gum arabic, starch, rock candy, a decoction of rice, etc.

PRACTICAL USE OF THE ABOVE MENTIONED SUBSTANCES.

Whatever the substances may be which are employed for fining wine, the mode of operation is as follows: After the material has been previously prepared, according to its special character, the bung is taken out of the cask and about two and one half gallons are drawn off by means of a siphon or other appliance; then the finings are introduced in the cask through the bunghole and the wine well stirred, either by a specially constructed instrument or by a stick which has been split into four parts at one end. When the substance is thus well mixed with the liquid, the wine, which had been first drawn off to facilitate this operation, is poured back into the cask. Nothing remains now to be done but to fill the cask accurately, bung it up, and let it rest.

It is not possible to state the precise length of time which is necessary to obtain a perfect clearing; this depends from the finings that have been used, their quantity, the quality of the wine which was subjected to the treatment, the greater or less uniformity of the temperature of the cellar, etc. In most instances, particularly if it is possible to maintain a uniform temperature in the cellar, it is advisable to allow the wine to rest for a fortnight or month before drawing it off. This length of time is most favorable to effect the clearing. For it has been noticed that if the wine is left a longer time in contact with the finings, there is danger that it may become turbid again and acquire a foreign taste, particularly if the lees should rise again owing to after-fermentation, or to expansion of the liquid. Besides, a prolonged contact of the lees with the clear wine can impart to it a disagreeable taste from mere contact, often without any turbidity having been noticed; this experience has been had with wines that had remained in contact with the finings for six months. If there is some hurry about sending off the wine, the process of fining should be watched from day to day, so as to rack the wine as soon as it has perfectly cleared. If the wines under treatment are in a cellar which does not have a constant temperature, particularly during very warm weather, the same precautions should be taken; also the temperature of the cellar should be lowered by the various means which we have mentioned in the first chapter. As soon as the wine has cleared it should be drawn off from the lees.

FININGS WHICH EXERCISE A MECHANICAL ACTION—FILTRATION.

As these substances (gray paper, fine siliceous sand) are neither dissolved, attacked, nor coagulated by any of the constituents of the wine, they effect its clearing by a kind of filtration; in passing through the liquid they carry down a part of the insoluble matters which they meet on their way; but it is seldom that by their use a perfectly bright condition of the wine is obtained. They should be used, therefore, only where other methods cannot be applied.

As far as the filtration through strainers is concerned, this method makes it possible to obtain perfectly clear wines. There is, however,

the drawback that, owing to the prolonged contact with the air, the wine becomes flat, loses some of its bouquet and flavor, particularly its fruity taste and oily consistency, and decreases also in alcoholic strength. Apart from these deteriorations, the filtration requires, in order to be carried on in a satisfactory manner, more manual labor than any other method of fining. It is, therefore, employed only in exceptional cases when it is impossible to use other methods. On board ship, for instance, where the pitching and rolling make all other methods impossible, filtration can be very useful. The same may also be the case when it is desired to send off the wine bottled as quick as possible; in this latter case the access of the air should be particularly avoided, and the whole work should be done rapidly.

Gray Paper Converted into Pulp—Preparation.—From five to ten leaves of paper are taken, torn to pieces, and soaked in half a gallon of wine, and afterwards converted to a pulp, first with the hands and afterwards with a pestle or a piece of wood; when the whole has acquired the desired degree of fineness, it is poured into the cask which is under treatment.

Fine and Siliceous Sand.—White and very fine sand is chosen, washed, and freed of any foreign matter it may contain. It is used in quantities of from one to two fifths of a gallon per barrel.

Filtration through Strainers.—For the purposes of filtering, strainers are used, made of different materials, such as wool, felt, unbleached cotton, etc. Woolen strainers should be chosen when large quantities have to be filtered; their form is conical and similar to that of a conic sugar loaf. (Fig. 128.) They are fixed by means of strings either below the tap or somewhere else, but always in such a way that it should be possible to place below them the vessels which are destined to hold the filtered liquid; they are kept open by adjusting a hoop to their orifice by means of strings. If the material of the strainer is easily permeable, it is necessary, in order to make the straining complete, to use gray or white unsized paper (filter paper) which has undergone the following treatment: Take two sheets of the paper and reduce them with some water to a pulp; mix this pulp very thoroughly with, say, two and one half gallons of wine in a jug. Pour, quickly, the turbid wine on the strainer, and introduce the pulp only when the filter is almost full. The first liquid which runs through the strainer is always turbid; filter it again until it is perfectly transparent. Take care to keep the filter always full to the same level, so that the pulp which sticks to its sides should not be displaced.

By means of a specially constructed wooden or tinned copper filter the operation may be carried on more protected from the access of the air, and also more rapidly. In this case the shape of the strainers is not the same—they form an oblong oval whose one end is tied to the lower end of a tube, and the produce of the filtration drops into a closed receiver. The whole operation becomes thus, with the help of the funnel which fits in the upper end of the tube, much easier, more effective, and more rapid. These filters, of which a drawing is given in Fig. 130, can be made, according to their diameter, with one, three, and even twelve tubes. In order to use them they are provided with strainers, which are tied to the tubes; the tubes are closed with cork stoppers inside the funnels. After the paper has been prepared and mixed with several gallons of the wine which has to be filtered, the funnel is filtered, and then the tube is opened. The turbid liquid fills and inflates a strainer; now the chief

stopcock, is opened in order to pour back the turbid liquid; then several gallons of the wine containing the paper are rapidly emptied, and the shredded paper does not fail to cover the interior of the strainer; the liquid is repeatedly poured back into the funnel until it is perfectly transparent. When this stage is reached, it suffices to add new liquid in the strainer, and when the latter has become too dirty another tube is opened and a second strainer is started exactly in the same way and without any necessity of displacing or changing anything.

ALKALINE FININGS.

Calcined and Powdered Pebbles, Calcined Oyster Shells, Powdered Marble, Chalk, Alabaster, Wood Ashes.—These alkaline materials combine with the acetic acid, the tartaric acid, etc., which are contained in the wine, and form thus salts (acetates and tartrates of potash or lime), a part of which remains in the liquid in suspension, producing turbidity and making the wine less wholesome.

The particles of these alkaline substances which are not attacked by the acids of the wine, exercise a mechanical action, which is analogous to that produced by sand; they sink gradually to the bottom of the cask, and carry down with them in their course a part of the impurities that are contained in the wine. The quantity of these materials that should be used is one quart per barrel.

These substances have been sometimes used, mixed with gelatine, for fining wines which do not contain tannin. In this case only one third of the usual quantity is used. A simple addition of tannin is much preferable.

It is evident from what we have said already that this method should be rather avoided. We shall have, in speaking of faulty wines, an opportunity to discuss more fully the effect of alkaline substances on musts and wines.

ALBUMINOUS FININGS.

Fresh White of Egg.—Albumen is an organic matter which is contained in the white of eggs, in the blood of animals, and in milk. Its constitutents are (in parts by weight): Carbon, 53.33; oxygen, 23.70; hydrogen, 15.50. Thus it differs from gelatine only by the relative proportion of the constituents. This substance, which is fluid, is soluble in cold water. It coagulates at a temperature below 122 degrees Fahrenheit. It is *coagulated also in the cold* by alcohol and tannin. These properties are utilized in the process of fining dry and sweet wines, cordials, and syrups. To fine liquids which stand easily a higher temperature (as, for instance, the syrups), albumen is dissolved in the liquid cold; then the whole is gradually heated; the heat coagulates and unites the molecules of albumen which are suspended in the liquid, expands them, and makes them specifically lighter; they rise to the surface of the liquid, and carry with them the impurities which they meet.

If the albumen is dissolved in cold alcoholic liquids, it is coagulated by the alcohol and tannin which are present. It forms a kind of network, which has a higher specific gravity than the wine, and sinks by its own gravity to the bottom of the cask, carrying down all matters in suspension.

Pure albumen is contained in the white of egg. According to M.

Payen, there are 12½ to 30 per cent of albumen in the white of egg. This albumen is liquid and inclosed in very thin-walled cells. This kind of tissue imparts to the albumen a gelatinous consistency. By suspending the white of egg in water, and beating the liquid, the walls of the cells are destroyed, and a clear solution is obtained.

For one barrel of wine the whites of six to eight eggs, on the average, should be used. These are beaten with about half a pint of the wine under treatment, and afterwards filled into the barrel.

The soundness of the eggs should be always ascertained by holding them to the light before breaking them. This precaution is very important, for it becomes evident that one rotten egg is more than sufficient to impart a disgusting taste to a barrel of wine.

If the wine under treatment is not of high quality, is young, very turbid, and does not clear easily, the white of eggs should be dissolved and beaten in one pint of water, in which a handful of common salt has been dissolved. The object of this addition of salt is to give more weight to the albumen, also to increase its density, and to precipitate it quicker to the bottom. We do not, however, advise the use of salt water, except for ordinary and very turbid wines. To experiment with it on first-class and old wines, should the alcohol-percentage of the wine be very low, an addition of one or two quarts of brandy to the barrel will promote the coagulation of the albumen.

ALBUMINOUS SUBSTANCES WHICH ARE NOT ENTIRELY COAGULATED.

Fresh or Dried Blood.—According to Rifïault, the blood contains usually three parts of serum and one of cruor. The serum does not contain gelatine, but a great deal of albumen. The cruor contains insoluble fibrine and a soluble coloring matter. The blood can therefore be used for fining instead of albumen, as it contains a good deal of albumen; but the blood of the ox, of the cow, or of the sheep, has a smell and a taste which is not agreeable. The blood of the hog is the best for this purpose. It is important that the blood should be odorless and tasteless, because it is only partly coagulated by the alcohol contained in the wine. Thus its aqueous part remains mixed with the wine, and is liable to impart to it a disagreeable taste and smell, which disappears only after a long time. For these reasons the use of blood for purifying old and fine wines should be avoided. The quantity which is usually employed is one quart per barrel, well mixed with one quart of wine or of salt water.

Milk.—Cow's milk contains, according to M. Payen, in one hundred parts by weight: water, 86.50 parts; nitrogenous matter (caseine albumine matter, soluble in alcohol), 4.30 parts; lactose (milk sugar), 5.20 parts; butter (or fatty matter), 3.70 parts; insoluble salts, 0.20 parts; soluble salts, 0.10 parts. One can see from this enumeration that the milk cannot be completely coagulated by the alcohol which is contained in the wine. The whey, or the watery part, remains in solution, and the milk sugar may give rise to an undesirable after-fermentation. The use of milk should be, therefore, avoided in the treatment of fine wines. The milk also exercises a discoloring action, and can be used for bleaching russet white wines. The quantity to be used is one quart per barrel, and it is poured in without mixing it previously, either with wine or with water.

The freshest milk should be used; for milk which is older than twenty-four hours can easily, particularly in summer, acquire acidity, which would be imparted to the wine. Milk has an alkaline reaction, and may thus be useful in diminishing the acidity of faulty wines, clarifying them at the same time (compare *Acidity*).

GELATINOUS SUBSTANCES.

Gelatine.—Gelatine is an organic substance which is chiefly contained in the sinews and in the hide of animals, in the bones and in certain parts of the body of fishes; it is extracted from these different materials by prolonged boiling with water. According to Gay-Lussac and Thénard, it contains (parts by weight): carbon, 47.881; oxygen, 27.207; hydrogen, 7.914, and nitrogen, 16.99.

Gelatine is susceptible of assuming, on cooling, an elastic consistency, and of becoming liquid again on heating; this is what distinguishes gelatine from albumen, which, on the contrary, is liquid in the cold and is coagulated by heat, without possessing the property of becoming liquid again on cooling.

Gelatine is soluble in water; it is precipitated by tannin, and on the other side tannin which is dissolved in a liquid is precipitated by gelatine; thus the two substances, by forming an insoluble compound, carry down with them the matters which are suspended in the liquid. On this quality the use of gelatine in the fining of wines is based. If tannin is present in the wine only in small quantities, the whole quantity of gelatine which was added will not be precipitated, and will thus remain in solution; in such a case it will be necessary to add some tannin to the wine in order to facilitate the precipitation of the gelatine (compare composition of the wines under the head of *Tannin*). It is possible, however, to precipitate the gelatine without the help of tannin by adding to the solution of gelatine just before using it alkaline substances, such as ashes, soda, lime, chalk; but these substances, though they increase the effectiveness of the gelatine, are objectionable, and we have already considered their action on wines.

Gelatine, of all the chemical finings, is the one which is most efficient if the wine contains sufficient tannin to precipitate it in full. But the loss of tannin is injurious to the keeping qualities of the wine (compare *Composition of wines*), and the gelatine which is used to fine red wines, precipitates, together with the tannin, a considerable part of the coloring matter with which the tannin is intimately combined. For this reason gelatine should be used in the treatment of red wines, only when it is desirable to diminish their harshness by removing the excess of their tannin and of their color; in one word, gelatine should be used when it is desired to age a wine. The utility of gelatine in the treatment of ordinary white wines cannot be denied. Should it now and then happen that a white wine does not clear on being treated with gelatine, one hundred and fifty to three hundred grains of tannin should be added to each barrel, so as to make the precipitation of the gelatine more complete. Nevertheless, we advise treatment of the finer white wines, of a mellow character, rather with pure albumen than with gelatine, in order to avoid an excess of precipitation, which would possibly carry down also the sweetish matters contained in the wine.

Preparation.—In commerce, the gelatine is found in tablets. One

tablet per barrel is used, and even two, if a very thorough clearing is desired. The gelatine is gradually warmed with one pint of water per tablet. Great care should be taken to stir continually, in order that the tablets should not stick to the bottom. The vessel is taken from the fire as soon as the gelatine is dissolved, which is done without the necessity of boiling. Boiling should be, on the contrary, avoided. Gelatine dissolves easier if it has been previously soaked in water for some hours.

Isinglass.—This isinglass is extracted from the air bladder of the sturgeon. It contains a large amount of gelatine, and, like the latter, is precipitated by tannin. It does not require, however, much tannin for its precipitation. It contains exceedingly tenuous membranes, which exercise a mechanical action, and are precipitated by their own weight. To prepare the fish glue for purposes of fining, the leaves of this material are beaten on a block and cut into as small pieces as possible. One and three quarters ounces for each barrel are soaked cold with half a pint of white wine during twelve hours. When the glue is thus almost dissolved, it is pressed repeatedly between the fingers, and a quarter of a pint more of white wine (per barrel), or in winter, water (warmed to 122 degrees), is added. After that the mixture is strongly beaten with a small broom, and the pieces of glue which have not dissolved completely are kneaded with the hands until they do so; then the whole is passed through a sieve. For further use it is diluted with one pint of white wine per barrel.

DIFFERENT OTHER SUBSTANCES WHICH ARE USED FOR PURPOSES OF FINING.

Decoction of Animal Sinews.—By boiling for twenty-four hours in water, sheep's or calves' feet, heads, etc., a liquid is obtained which, on cooling, solidifies to a jelly which contains a large quantity of gelatine, and which can be used for the same purposes as gelatine if, before being dissolved a second time, it is first dried in a warm place. Only fresh materials should be used, else there is danger of imparting a bad taste to the wine.

Glue.—Glue, which is prepared from the refuse of slaughter houses, imparts often to the wine a disagreeable taste, and should be used only when no other materials can be obtained. The quantity employed for each barrel is eight and three quarters ounces, which should be dissolved in one pint of hot water. This liquid is added to one quart of the wine, and then poured into the cask. This glue is, like gelatine, precipitated by tannin.

Gum Arabic, Powdered Rock Candy, Starch, Decoction of Rice.—Powdered gum arabic as well as rock candy are not rapidly and completely precipitated, and the amount which remains dissolved in the wine gives rise to after-fermentation. This is a very poor process. The quantity required is six ounces per barrel. Starch dissolved in hot water and a decoction of rice and of flour have been sometimes used as finings. Their use is based on the fact that starch and gluten are precipitated by tannin; but the precipitation is not a complete one, and these substances introduce into the wines harmful ferments. The quantity used is one quart of the decoction per barrel; this quantity is mixed with one quart of the wine and then poured into the cask.

RECAPITULATION.

The Best Finings.—The best finings are those which remove the suspended matter in the wine, without leaving a soluble residue, without imparting a bad taste to the wine, and without exercising any action on the chief constituents of the wine. All these conditions are fulfilled by pure albumen or fresh white of egg.

Pure gelatine and isinglass do not leave soluble residues in the wine, but they possess the disagreeable property of precipitating the tannin and a part of the color. For this reason they should not be used with red wines, unless the wine is a poor one, or economy is an object, the price of these materials being lower than that of fresh eggs. For ordinary white wines, whose alcohol-percentage is low, they are the best finings. With the help of tannin, which is added to the wine, a perfectly bright condition is obtained. But those white wines of highest quality, which have a high alcohol-percentage, should be rather treated with albumen, which does not take away so much of their flavor as gelatine does.

All we have said makes it evident how important it is to be posted on the action and nature of the finings which are generally used. It is consequently impossible for us to speak without being prejudicial to the vendors of the various compositions met with in commerce under different names, *and without designating the substances which enter their composition.* Besides, these substances are mostly composed of what we have described above.

It should be added that, when it is necessary to clarify *fine* and *high priced* wines, it is important that the foreman of the cellar—who is responsible for the work—or the proprietor, should know and select the substance according to the character of the wine which has to be fined. Under no circumstances whatever should he use substances with whose composition and action he is not perfectly familiar.

CHAPTER III.

SPECIAL TREATMENT OF VARIOUS KINDS OF WINES.

Treatment of young red wines. Treatment of old red wines. Treatment of white wines. Racking.

TREATMENT OF YOUNG RED WINES.

We have already spoken, in discussing the drawing off of the must from the pomace, of the inconveniences which result from performing this operation either too early or too late. Let us suppose, therefore, that the wine has been drawn off and filled into casks, an operation which may be performed in two ways: Either the casks are placed directly under the tank or the wine is drawn off into a tub and carried in buckets to the cellar. Here it is poured through funnels into the casks, care being taken to distribute each drawing in equal parts through the casks required to receive the contents of the several fermenting tanks, in order that a homogeneous wine should result. Before entering into details we desire to call attention to a widespread error as

to the amount of labor and attention which should be bestowed on the wine. Many wine makers and coopers think they have done all that can be done for the wines which are in their charge if they have filled up the casks and racked at periods which are fixed by tradition; but whosoever has experience in the business knows that it is impossible to state precisely the time when racking is necessary. Intelligent care, frequent and timely racking are required to preserve the wine from injurious alterations, which can be produced by various causes. Thus, even if a wine is racked at certain periods, this does not mean that everything required has been done for it; for perhaps the other precautions have been neglected, which its nature, its composition, the cellar in which it is placed, and the alterations which it may possibly undergo, make necessary.

Young wines, after having been pressed, have, as a rule, not completed their fermentation, and though they may not contain any quantity of sugar which is either appreciable to the taste or to the spindle, they continue to ferment in the barrel. Under such circumstances, a small quantity of alcohol is formed by the transformation of the small amount of the fruit sugar which remains in the wine; but this after-fermentation is not always a vinous one, particularly if the first fermentation has been well conducted. Sometimes the pricking taste which the wine retains some days after having been pressed, is mostly due to carbonic acid, which is gradually given off. The wine should be attentively watched at this time, and the casks should be bunged hermetically as soon as the after-fermentation is over—that is, when the wine has lost the pricking taste which is due to the presence of carbonic acid, and when no more of this gas escapes through the bunghole.

As soon as the casks are filled, they should be placed on racks, or on blocks of wood, and be bunged; then the bung is taken out again and some more wine added, so that the cask is filled up to the bunghole. When this is done, the bunghole is covered with a flat piece of wood, or with a new bung, which is placed loosely on the bunghole, with its thicker end downwards, or with vine leaves loaded down with sand; thus the casks are only loosely closed, so that the carbonic acid gas may easily escape. Every two days the casks are filled up to the bunghole with wine from the same vintage, to make good the loss by evaporation. There are also used for young wines, which are still fermenting, various other kinds of bungs, which allow the passage of the gas through a small aperture; but these bungs are objectionable, because they also give access to the air, and moldiness sets in as soon as the liberation of carbonic acid gas has ceased.

The wine should be tasted each time the filling is done; and as soon as it is found that the after-fermentation has stopped and no more carbonic acid is liberated, the casks should be solidly bunged with ordinary bungs. The best for this purpose are conic bungs made from oak and carefully turned. From now on the cask should be filled up at least every eight days.

The young wines are sometimes turbid on leaving the fermenting tank, particularly if they have been drawn off at other than the right time.

The filling up of the barrels is very simple. For this a vessel is employed specially prepared with a hooked nozzle, for casks filled up with this utensil so as to partly cover the bungs causes some loss of

wine to take place, particularly in the hands of untrained workingmen, owing to the difficulty of seeing if the cask is full. These losses can be avoided by using the funnel shown in Fig. 16.

When the wines which have been made from perfectly sound and ripe grapes have been pressed, and when the violent fermentation is over, if the pressing has been done at the proper time, they are almost clear, though during the tumultuous generation of carbonic acid they were turbid. This first natural classification is due to the formation of insoluble compounds, consisting of organic albumen, tannin, pectine, etc., which are coagulated or precipitated by alcohol; but it is chiefly due to the cessation of the ascending movement of the bubbles of carbonic acid; the latter, by rising from the wort to the surface, carries up and leaves in suspension a number of foreign substances, such as particles of the skins, seeds, coloring matters, organic salts, and particularly a great deal of salts of tartar. When the violent evolution of carbonic acid ceases, a part of these matters sink to the bottom of the liquid, owing to their gravity, and thus a mechanical and chemical clearing results. The latter is due, as we have already remarked, to the chemical reactions which go on between the various components of the new wine.

As long as a visible fermentation goes on, and as long as carbonic acid is evolved, the lees, which are formed by the insoluble matters, do not settle to the bottom of the casks, but remain in suspension. This is the reason why the wines become turbid, and that often they are less clear several days after than immediately after having been pressed, but as soon as the fermentation is over a more or less complete precipitation of the first lees, called *bourres*, is effected. These lees contain a great deal of ferments, of tartrates, of insoluble coloring matters, and other salts.

As soon as the after-fermentation has ceased, and the wine has become clear, it is advisable to rack it off as soon as possible from the first lees, in order to preserve it from the action of the ferments, which are contained in the latter. This first racking cannot be done at any fixed time. The period depends upon the nature of the wine, the temperature of the atmosphere, etc. Generally, when a wine is well made, the fermentation ceases entirely during the month of November; it clears then, and can be racked for the first time in December.

We have repeatedly observed that wines which have been racked with care as soon as the fermentation has stopped, and as soon as the first lees have been deposited, are less liable to undergo an after-fermentation than those which have been allowed to remain on the lees until spring-time, and that they become perfectly clear with the least difficulty. This fact may be explained thus: By the end of November, and in December, the temperature sinks gradually, and exercises on the wine a contracting influence, thus facilitating clearing and precipitation of the insoluble matters. If, on the contrary, the first racking is done as late as March (the time when generally the first racking is done), the wines may experience a slight after-fermentation before the racking. This after-fermentation is due to the presence of ferments in the lees. At this time of the year, the gradual rise in the temperature expands the wines and disturbs the lees, of which the lightest particles mix with the wine and produce turbidity. Under such circumstances the wine is racked off in a turbid state, holding in suspension a quantity of ferments; then it becomes difficult to clarify the wine and to preserve it

from secondary fermentation. Sometimes, even, it assumes a disagreeable taste of lees. These accidents can be avoided by racking the first time in December, and by finishing the spring racking before the temperature has risen considerably—for instance, during the month of March.

The barrels containing the new wines should rest in the warehouse until the autumnal equinox which follows the vintage, *i. e.*, until September. They should be kept hermetically bunged and always full. They should be filled once every eight days in close cellars, and twice a week in ventilated cellars, in which the evaporation is considerable. At any rate, it should be ascertained if the wine is inclined to moldiness or not, because in this case it would be necessary to fill up more frequently. To prevent moldiness it is best to bung the casks very carefully. If the casks are piled in single tiers they are filled up by means of the ordinary filling-pot; but if they are stacked high care is taken to use long bungs in order to make it easier to take them out, and the filling up is done with the help of the pot and of a bended funnel in the shape of a Z. This funnel, which is called a Z funnel (see Fig. 16), is arranged in a manner such that near its end can be fixed a piece of candle, destined to light the bunghole. The linen which is used to wrap the bungs should be kept clean and renewed as soon as it becomes dirty or acquires an acid odor.

By smoothing and rounding out the bunghole well, and by using long bungs, which are carefully turned, it is possible to bung hermetically by hand without the necessity of wrapping the bung in linen.

After the first two rackings of December and of March, the wine is racked a third time in the month of June, and for the fourth and last time during the autumnal equinox. Afterwards the casks are permanently bunged and placed with the bung sidewise. From this time the wines should be treated as old wines.

These prescriptions apply to the wines which are stored in close cellars and to wines which do not "work;" and, indeed, some wines are liable to set in "working," even when the after-fermentation is over, notwithstanding they may have been repeatedly racked. This happens particularly with wines which have been moved, shifted, transported without having been racked at all, and also with those which are stored in cellars whose temperature is not constant. In the first case, the after-fermentation should be prevented by timely racking; the condition of the wine should be also ascertained by frequent tasting.

In summing up, the treatment which should be bestowed on new wines consists:

1. In placing in well-hooped casks, with loose or open bung, in close cellars, and by filling them up constantly and regularly with wines of the same character.

2. In racking the new wine from the first deposit of lees as soon as the after-fermentation is over and as soon as it has cleared; that is, toward the month of December, and in racking again before the spring equinox, again toward the summer solstice, and during the autumnal equinox.

3. In preventing after-fermentations by racking each time when it is found on tasting that the wine begins to "work."

If the wine is clear the use of finings should be avoided, in order not to diminish the fruity taste; but if it remains turbid after the second racking it should be treated with white of egg after the third racking,

and the wine should remain the shortest time possible in contact with the finings.

By such a treatment, clear wines without tendency to working can be obtained, which, if they are wines of the highest quality, will keep their fruity taste. On the contrary, if the young wines are allowed to "work" after their after-fermentation is over, they lose their fruity taste, their mellowness, and become dry. To avoid this dryness, which is produced by the working and which decreases considerably the value of the wines, particularly of the fine wines, the casks with wines which date from hot years should not be placed with the bunghole sideways after the June racking, for at this time of the year the expansion resulting from the rise of temperature may set the wines to fermenting.

For the same reasons the wines which have to be sent off before the regular time of the first racking should be racked from the first deposit of lees as soon as they have become clear, because if the lees mix again with the wine the latter becomes disposed to undergo after-fermentations, and thus loses its mellow taste.

During the first year the wines lose by evaporation twice as much as they lose when they are old, and the amount of labor they require is three times as great. Even if they are placed in cellars which are very well protected from the access of the air, the losses which are occasioned by evaporation, filling up, and racking may reach the 8 per cent provided for by the law.

In filling up the casks which are stacked up, by means of the Z nozzle or funnel, it happens frequently that a few drops run out of the bunghole. The small losses which occur every time when the barrel is filled up increase the total waste considerably by the end of the year.

In the cellars of northern France—as, for instance, in Paris—the barrels with the young wine are not kept full. As soon as they arrive they are stacked up in tiers just as if they were old wines. Not infrequently the bung is left undisturbed, and perhaps on the side; and in order that the casks should not be bursted by the working, a gimlet hole for vent is bored in the upper part of the bulge and left open. This method is an extremely poor one, because the contact with the air changes the wine, makes it flat, and produces after-fermentation.

TREATMENT OF OLD RED WINES.

One-year old wines are treated, after the autumnal racking, like old wines.

If their taste is frank, if they are clear and not "working," the casks are completely filled, bunged, and placed with the bunghole sideways in the cellar (see *Cellars*).

If they are faulty, turbid, or if they are "working," the faults with which they are affected should be first treated in an appropriate manner (compare *Faulty wines* and *Clarification*). But if the wines have been treated with care as long as they were young they are rarely faulty, unless the cellar in which they have been placed subjects them to sudden changes of temperature.

In perfectly air-tight cellars the old red wines which have a frank taste, which are clear and not "working," and which are preserved in strong casks carefully hooped with iron, require only two rackings a year; the one in March before the spring equinox, and the other in September

at the time of the autumnal equinox; unless, from whatever reason it may be, they lose their bright condition by again beginning to "work;" this can be ascertained by tasting them from time to time. In this case it would be necessary to rack them immediately, and to use finings. We should avoid leaving an empty space in the casks with old wine, either by taking samples frequently or by tasting too often. Thus, as soon as there is an empty space in a cask, owing either to one of the above reasons or to a leak, even if the deficiency amounts to not more than half a gallon, the wine should be drawn off immediately in order to avoid the pernicious influence of prolonged contact of the air with its surface. The rackings should be more frequent in cellars which are not close, and where the evaporation is greater, in order to prevent the wine from becoming flat or acid, or liable to undergo after-fermentation.

If all these prescriptions are carefully observed, the wines will improve and develop all the qualities they are able to acquire, according to their nature. The greater or less excellency which the wines acquire by aging under favorable conditions, is due to two chief reasons. The first is the separating out of the coloring matters, and of the various salts which are dissolved in the young wines, and which become afterwards insoluble by the formation of new compounds, which, in their turn, are removed at each racking with the lees. The second reason is the transformation of the tannin, which gives a certain harshness to the wine, into gallic acid. It is then precipitated through the formation of insoluble compounds with certain substances that are contained in the wine and in the finings. The result is that the old wine loses some of its original color and soluble salts, and a large quantity of tannin; its taste becomes, therefore, finer; its flavor, which was hidden by these substances, comes into greater prominence, and the bouquet, which chiefly consists of ethers, begins to develop; the mellow taste is also more decided. These observations apply chiefly to wines of the highest quality, because many of the ordinary wines lose the fruity taste which they had when they were young before the end of the first year. This is due to the fact that the mucilaginous substances and the pectine, which impart the mellow taste, are precipitated with the lees or destroyed by the after-fermentation.

Generally these wines are lacking in strength, body, and tannin, and many among them show besides a great tendency to lose their color. The time required for a wine to reach the highest degree of excellency which it is able to attain in the barrel, is not the same for all; thus, certain strong and harsh wines require much more time than the delicate wines. On the average, those Medoc wines which are the lightest in body attain the completion of the natural clarification towards the end of the second year. If they are kept longer in the barrels they lose their mellow taste. The wines from the same region, which, on the contrary, are strong and full-bodied, should remain one year longer in the barrels, in order to reach perfect maturity. Certain wines, with a very large amount of tannin, take a long time to develop perfectly, but they keep, also, much longer.

When the wines have reached their full maturity, and when no more lees are separating out, they should be bottled, else they lose their good qualities. In the bottles they complete their maturing; they acquire bouquet and preserve at the same time their mellow taste, while in the

casks they lose in the end their fruity and velvety taste and become hard and dry.

One should be a connoisseur in wines and have a certain knowledge of the wines which are under treatment in order to fix the time which is best suited for bottling. We shall mention the details of this matter in the chapter on the *bottling of wines.*

What we have said of old wines may be summarized as follows:

1. They should be stored in perfectly close cellars, and before they are placed with the bunghole sidewise it should be ascertained that they are perfectly bright and free from defects.

2. The lees which separate out should be removed by careful racking every half year; the casks should be always kept full, and after-fermentations should be prevented by attentively watching the wine, and racking when necessary.

3. The loss by evaporation should be reduced to the smallest possible amount, by keeping the wine close in cellars and in strong, iron-hooped casks.

4. The wine should be bottled before it has lost its fruity taste, and as soon as the lees have completely settled down. By following these prescriptions, it will be possible to make a wine acquire, in due time, all of the qualities possible.

But if the cellars are not tight, if the evaporation is considerable, and if empty spaces are left in the casks by taking samples too often, or if racking is not done frequently enough, the wine is liable to set in working, and become hard, to lose its mellow taste, and to undergo a slight change, which is due to the presence of acetic acid, formed by contact of the wine with the air.

TREATMENT OF WHITE WINES.

As the fermentation of the white wines is going on in the barrels, their treatment begins as soon as the must is in the barrels, in which they are filled without any preparatory operations as soon as they have left the press. In each barrel a more or less violent fermentation sets in, according to the quantity of grape sugar present, and to the temperature of the must and of the surrounding atmosphere, etc.

We know that there exists three kinds of white wines; the differences between them are produced by the greater or less amount of sugar in the must, by the different methods of vinification, by the variety of grapes used, etc.—there are the dry white wines, the mellow white wines, and the sweet white wines.

There are besides, *sparkling* wines, which are made from red and white grapes; but we are going to speak of them in a special chapter. The care which should be bestowed on the white wines begins, as we have already said, as soon as the must has left the press and has been transferred to the barrels.

The barrels are filled only up to two inches from the bunghole, in order to leave room enough for the expansion which is produced by the bubbles of carbonic acid, generated as soon as fermentation has started. If this precaution is taken all loss of must is avoided.

The violent fermentation begins after the first twenty-four hours. As soon as it has started in violently the foam which rises to the surface of the liquid is made to run down the walls of the keg by filling up every

day with must of the same character; the bungholes are left open from the start. The method which consists in making the foam flow out of the barrel in proportion as it rises to the surface of the wine—a method which is different from that of fermenting in tanks or in partly empty barrels, when the lees remain in the wine—is used in the fermentation of the high quality wines of the Gironde, such as Barsac, Sauternes, etc. The method is based on the principle that the removal of this foam, which consists partly of ferments, produces a kind of a purification by carrying out of the barrel with it some of the injurious matters.

The result is that the lees are less voluminous and that the fermentation lasts a longer time. The wines which are made according to this rule retain the mellow taste better than those (the specific gravity of the must being the same) which have been fermented in partially filled kegs. The explanation of this is that in the former case a small quantity of mucilaginous substance escapes the action of ferments, while in the other case the fermentation is more energetic, all of the sugar is transformed into alcohol, and such wines are therefore dry and less agreeable to the taste.

Therefore, the first violent fermentation of white wines which are destined for further use without previous blending or any other operation, should be conducted in completely filled kegs. As far as the white wines are concerned, which are destined for concentration by heat or for blending, these fermentations should be conducted in partially filled barrels or in covered tanks, so that the foam and ferment should remain in the wine until the fermentation is over, in order to give increased activity to the latter, and to insure the complete transformation of all the sugar present into alcohol.

As soon as the fermentation of the white wines becomes less violent, and no more foam is produced, the bungholes are covered loosely with a piece of wood, so as to give an outlet to the carbonic acid gas, and the barrels are filled up every two days. At last, when the evolution of carbonic acid has stopped, the barrels are hermetically bunged, and once or twice a week filled up according to the greater or less rate of evaporation. The wine should be racked as soon as the lees have settled and its condition has become bright; in this respect no time can be fixed, because the duration of the fermentation of the white wines depends chiefly upon the specific gravity of the must and upon the temperature of the atmosphere; at any rate, it lasts much longer than that of the red wines. It often happens that the fermentation is not over before the month of February, particularly that of wines which are very rich in sugar, such as the Sauternes, and particularly if the end of the autumn is cold; while the wines which come from the same vineyard, and which are made under the same conditions, but which contain less sugar, will be through with their fermentation in December. Moving the white wines in the course of fermentation should be avoided, particularly when the lees begin to settle, because, by mixing them again with the wine, the fermentation is rendered more active, and the mucilaginous substances are destroyed, by transformation into alcohol. Consequently, the mellow taste, which gives to the white wines their value, is lost. Such are the precautions which should be exercised during fermentation; the latter, it must be added, can be stopped, delayed, or prevented at liberty, by the use of sulphurous acid gas, according to which kind of wines are desired — sweet or dry ones

(compare Manufacture of preserved musts). If the sweet white wines have less than 15 per cent of alcohol, they are liable to undergo fermentation.

It is possible, by treating the white wines with sulphurous acid, to maintain them sweet from one vintage to the other, even if they are made from rather weak musts; but it is not possible to obtain this result with such musts, unless they are repeatedly treated with sulphurous acid, and protected from the access of the air; and in such a case the wine is liable to acquire the taste and smell of the sulphurous acid; besides, when strict watch is not kept over them they begin to ferment. In order that white wines which are treated in the usual way should preserve their sweetness, it is necessary either that the musts should be very rich in sugar (16 per cent to 20 per cent) or that they should be fortified so as to contain 15 per cent to 18 per cent of alcohol after their fermentation is over. But this method of fortification is only used in making the sweet wines. We shall speak of it more explicitly in the chapter on *Sweet wines.*

The white wines which are destined to be used when they are still sweet are transported either in form of must, which has been lately pressed, or during their most violent fermentation. If the must has been sent off without the fermentation having started, the latter begins on the way, and becomes violent, owing to the motion of transportation, particularly if the temperature is high, if the voyage lasts several days, and if no sulphurous acid or artificial finings have been used. Even the treatment with finings alone, without the help of sulphurous acid, makes the fermentation of a must less violent. (Compare Classification of unfermented wines.)

In order to prevent the bursting of the bottom of the casks through the generation of carbonic acid and the expansion of the liquid, a small hole, which affords an outlet to the gas, is bored near the bunghole. Now, in order to avoid the wines flowing out in rolling the cask, a tin button is introduced in this opening which is retained in the stave by a stem of the same metal. This stem is bent on the inside of the stave so as to allow the button to rise a little and give an outlet to the gas. Instead of this button with metallic stem, three or four straws with their ears yet on, may be introduced in this opening; the ears remain outside of the stave and do the same service as the button.

Notwithstanding these precautions, there is great loss connected with this manner of transporting white wines, particularly if the men in charge do not watch carefully to see that the fermentation goes on freely in each barrel, and that the latter should be always placed with the bunghole right side up.

Care should be taken not to transport white wines of high quality, and generally, all the sweet or simply mellow wines which retain a part of their sugar in aging, as long as they ferment. There are two reasons for that: the first is that the fermentation, stimulated by the ferments and the first lees which have already settled and now rise again, is liable to become too violent (particularly if the wines had less than 15 per cent of alcohol), and that thus the mucilaginous substances are transformed into alcohol, making the wines dry and difficult to clarify; the second is the great amount of losses which result from the transportation of the wine in this condition.

Racking.—After the first violent fermentation of white wines is entirely

over, and as soon as they have become bright, they should be racked, particularly if the temperature is rising. It should be mentioned here that the less grape sugar a must contains the sooner the wine becomes bright, for the fermentation of the musts which contain little sugar is more rapid than that of musts which are rich in this ingredient.

The most favorable time for the first racking is the month of February, before the rise of the temperature makes the wines expand and which raises the lees.

In racking it is strictly necessary to avoid contact with the air and to fill the wine into strongly sulphured kegs.

The care which should be bestowed on a white wine after its first racking varies according to the quality of the wine.

If we have to deal with ordinary dry wines, that is, with wines whose sugar has been entirely destroyed by fermentation and changed into alcohol, they should be treated in the same way as new red wines.

But the mellow white wines, that is, those which retain still some sugar after the first violent fermentation is through, require (particularly if they don't contain fully 15 per cent of alcohol) minute watching in order to preserve their mellow taste in aging, for if they are left to themselves they undergo a second fermentation and become dry.

In order to age without losing their mellow taste, these wines *should be protected from any after-fermentation*, and should be classified and freed from their ferments by the use of as little as possible of *finings or filtration. Both of them diminish the mellow taste.* To attain this object, the following conditions should be fulfilled: The wine should be—

(1) Placed in perfectly close cellars of uniform temperature, and the kegs should be strong and hooped with iron.

(2) The barrels should be hermetically bunged, and always filled up to the bung with bright wines of the same quality and of the same temperature.

(3) Cleared, preserved from after-fermenation, and freed from the ferments, which they still contain, by racking during the first year in proportion as the lees settle. Finings should be used only in cases when it is impossible to obtain perfect clearing by racking at the proper time.

(4) When the wines have reached, in barrels, their third or fourth year, in case they are not bottled, they should be racked and preserved in *tuns*, and treated in the same way as if they had remained in barrels. These tuns should have been previously used for white wines of the same character.

(5) The wine should be constantly watched, and it should be ascertained by frequent tastings if no fermentation has set in; in the latter case the wine should be immediately racked. If the wine remains quiet after the first violent fermentation is over, it should be racked every year three times, be it an old or a new wine. The first racking is done in March, before the spring equinox; the second at the time of the bloom of the vine in June, before midsummer, and the third and last at the time of the maturing of the grapes in September, before the autumnal equinox.

It is worth while remembering that the less alcohol white wines contain, that is, those which remain mellow after their first violent fermentation, the more liable are they to undergo an after-fermentation and to thus lose their mellow character. If the white wines on hand are sweet

and contain less than 15 per cent of alcohol, it is necessary to fine them completely in order to free them from their ferments. Certain ordinary white wines are difficult to fine. It is possible to obtain perfect clearing only by the simultaneous employment of the racking treatment with sulphurous acid and of gelatine in conjunction with tannin. This tendency to ferment is quite natural for wines which are poor in alcohol; and the mellow wines which contain less than 15 per cent of alcohol are not through with their natural violent fermentation; stopped either by the use of sulphurous acid or by frequent rackings or by other means. This stopped fermentation sets in easily again as soon as the wine is left to itself and as soon as the needful watchfulness is relaxed. A rise in the temperature or the wine being transported produces the same result.

In the wines, on the contrary, which attain the highest alcoholic percentage due to fermentation (between 15 and 16 per cent), no new alcohol is formed at the expense of the sugar, unless the liquid becomes weaker through evaporation. These wines are consequently less liable to undergo fermentation, other conditions being equal. If it is necessary to send to a great distance, or even only to preserve sweetish, mellow, but ordinary wines, whose alcohol-percentage is low, they should be slightly fortified with a very strong and pure alcohol, so as to contain 15 to 20 per cent of this ingredient. This only after having become perfectly bright. It will thus be possible to preserve them under ordinary conditions and to transport them easily; it is not advisable, however, to make use of this extreme means excepting in the case of wines which are sweet but which possess an ordinary flavor.

CHAPTER IV.

BOTTLING.

Choice of Wines to be Bottled.—Only wines which date from a satisfactory vintage, which possess a fruity taste, and which are susceptible of acquiring and developing flavor and bouquet on aging, should be put aside for purposes of bottling and aging. Wines which date from an indifferent vintage, or which were made from an ordinary variety of grapes and which are faulty, thin, tart, rough, etc., should not be bottled and stored in cellars, because they are not susceptible of improving in quality on aging, and because consequently it would mean the loss of the interest on a capital which has been invested in bottles, fixtures, and labor.

The wines which are destined to be bottled should fulfill the following conditions:

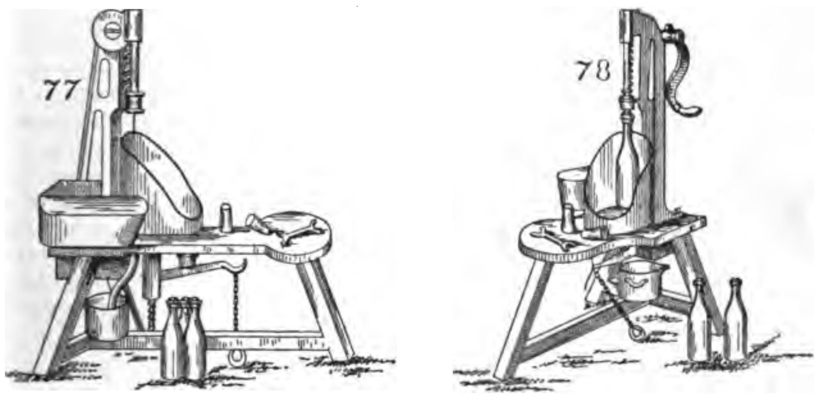
1. They should be perfectly bright.

2. Their natural clearing should be completely finished, *i. e.*, they should be entirely free from excess of color, of ferments, and of salts, which they keep in suspension during the first years, and which settle on standing and on treatment with finings.

3. They should also be completely through with the after-fermentations.

Should the wines be bottled without fulfilling these conditions—that is, should they be too young or turbid, two grave inconveniences would be the result.

Should the wine be bottled when it is yet too young, the after-fermentation, the separating out and settling of the lees, would continue in the bottles; the wine would acquire a taste of lees and a disagreeable bitterness, and even the bottles would burst should the fermentation be too strong owing to the generation of carbonic acid gas. Anyhow, voluminous sediments would form in the bottles; they would even necessitate the emptying of the bottles into barrels—slow and expensive operations, which are injurious to the quality of fine wines.



CORKING MACHINES.

77, 78. Machine for corking bottles (system, Gerrais). This machine is a modification of the ancient machine (drawing No. 79). The corking and movement of the needle is done automatically; the hand-lever is replaced by a treadle (foot-board), and a basin is present to receive the liquid produced by breakage.

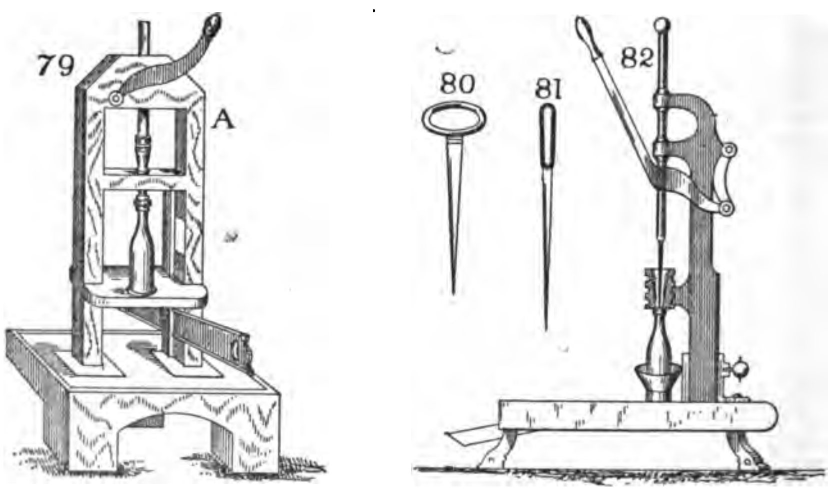
It is not possible to state precisely the age which mellow wines should possess in order to be bottled in good condition. In this respect it is only possible to go on general principles. It depends equally upon the more or less favorable conditions of the vintage as upon the variety of the wine, of the crop, of the stock, of the processes of vinification that were used, of the labor and attention which have been bestowed on the wine, etc. As a rule, the delicate wines which are low in alcohol and deficient in color, or those which date from the years when the grapes did not fully mature, are the most advanced, while the strong, full-bodied wines with a deep color, dating from warm years, are the slowest to deposit the solid matters in the barrel; it is self-evident that such wines keep much longer in bottles, while on the contrary wines which age rapidly in barrels do not last a long time.

The most precocious wines of the Gironde are fit to be bottled towards the end of their second year. The Medoc wines, as a rule, which date from hot years, reach this stage only in their third year. If they remain longer in the barrel, they are apt to lose their mellow taste. Exceptionally, however, certain very full-bodied wines require four years.

If a wine possesses a high alcohol-percentage, together with a rich color and much tannin, a long time is required for it to develop in the barrel. The first crops of Saint Emilion, and particularly the first Queyries, belong to this category. We have seen Queyries of pure *Petit Verdot*, of the year 1851, which, after having been for six years in bar-

rels, were hardly sufficiently mature to be bottled; but this is only an exceptional case, which is due to the stock, for in the same country the wines which are made from *Vidure*, *Malbec*, *Merlot*, etc., are fit to be bottled from the beginning of their third year, and even often towards the end of their second year; but they do not last so long.

The indications that a wine fulfills the necessary conditions in order to be bottled are: that it should be well freed from the lees so that there should be hardly any sediments at the times of the half-yearly rackings; that its color should be brilliant, and that it should have lost the roughness and harshness of the first years, but that it should retain at the same time its mellow taste. It should not be expected that the fine wines will develop their bouquet in the barrel. In olden times the latter method was followed. The wine was allowed to remain in the cask until it almost began to degenerate, and only then was it bottled. The use of this method makes the wine not only lose a part of its velvety, mellow taste, but it has also been proved by experience that wines which have been treated in such a manner do not last so long as those which are bottled *before the bouquet has developed and while they have their fruity taste.* In this case the only drawback is that the possibility exists of obtaining earlier and more voluminous sediments in the bottles unless the greatest precautions have been exercised to bottle the wine only when it has perfectly cleared.



79. Corking machine, ancient model—description of its working see text. A hook is adapted to *a* in order to withdraw the needle from the neck of the bottle.
80. Needle for corking (ancient model) with ring and hinge.
81. Needle specially designed for use in the machine Savinean.
82. Corking machine of Savinean—see description of its working given in the text.

Preliminary Preparation of the Wine in Barrels.—Even if the wine which is destined for bottling appears bright, it should be first racked and fined, as a matter of precaution, in order to precipitate completely all the insoluble matters which may be in suspension.

The kind of finings most preferable is albumen; the white of six to eight eggs. As soon as the wine has become perfectly bright during the month which follows the treatment with finings, it should be racked; the

barrel should be also slightly sulphured; the wine is now allowed to remain in the barrel at least three weeks before bottling it. We should avoid bottling wines which contain finings, for the lees, which may have been disturbed by the moving of the barrel, rise frequently to the stopcock and make the liquid turbid.

If, however, the wine which is destined to be bottled is perfectly bright, and if it is very delicate and mellow, it is admissible to dispense with the treatment with finings in order not to diminish the body and to destroy to no purpose the fruity taste. In this case it is sufficient to rack the wine and allow it afterwards to rest.

It should not be forgotten, however, that a bright condition of the wine is essential; if this detail is neglected there is sure to form in the bottles a voluminous sediment. If it is absolutely necessary to bottle wines which are too young, they should be repeatedly fined, in order to avoid a too early formation of sediments. These repeated finings, it is true, bring down the insoluble matters, but they also make the wines harsh, because they precipitate as well the matters which impart the oily and mellow taste.

Rinsing the Bottles.—The bottles are washed and rinsed, as a rule, in the glassworks, or in the store-houses, unless they are destined for a long voyage, or unless an agreement to the contrary has been made. These are afterwards placed in draining baskets. These baskets are used for their transportation; for the same purpose pigeon-holes are sometimes used. If wines dating from an extra good vintage have to be bottled, the bottles should be sorted, and those which possess too prominent unevenness in the glass and whose apertures and bottoms are irregular shaped, as well as those which possess any other blemishes, should be put aside. After sorting, the bottles should be thoroughly washed, and drained in the baskets.

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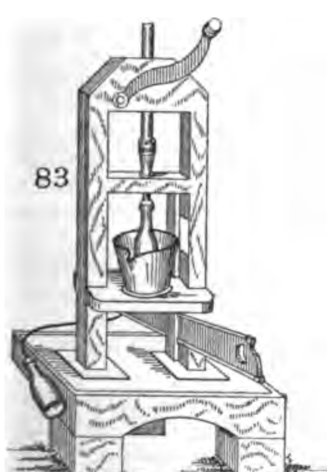

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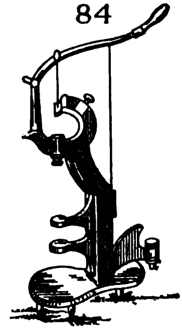


83. Corking machine (system of Kehrig). This is the machine used in Bordeaux. It resembles Fig. 79, to which is added a reservoir destined to receive the liquid produced by breakage.

84. Small corking machine. These small machines, of which many patterns exist, are used only in a small way.

This precaution is necessary, for in the glass manufactories great quantities of bottles are rinsed in the same water, and consequently the degree of cleanliness attained is a doubtful one. In order to rinse easily, one should have either two tubs, which may be made from a barrel, or a hogshead, sawed into halves; or two basins in the form of a lozenge, three feet long and two feet high, which are covered inside with tin or zinc, or are made of beton. In winter the water may be easily warmed by means of a stove covered by a hermetically closed boiler, which communicates with the water of the basin. This arrangement is useful only in cases where a great number of bottles have to be rinsed every day. In a cellar of the ordinary size the two tubs are mounted on a stool.

The bottles should be drained in the basket for one or several hours before being filled; but they should not be left in this condition during several days, particularly in moist cellars, for the humidity might possibly develop mold on their inner surface, which would impart to the wine a bad taste. In this case they should be rinsed again before being used.

The bottles, after having been rinsed and drained, are filled, as a rule, without any other preparatory measure. If, however, the wine which is being bottled has a low alcohol-percentage, and not much body, and is deprived of its preserving elements by excessive age, its keeping qualities can be increased by pouring a little old brandy into each bottle before filling.

This brandy is transferred from one bottle to another without allowing them to drain too long. *It would be an excellent method to rinse the bottles with wine of the same character as the one which is destined to be bottled, particularly in the case of the extra fine wines.*

The only drawback to this method, which is a very good one, is that it requires one more workman and the expense of a couple of bottles of wine, which becomes turbid and weak after having been used for rinsing.

THE BOTTLING PROPER.—The bottling is generally performed with the help of a copper faucet of the usual pattern.

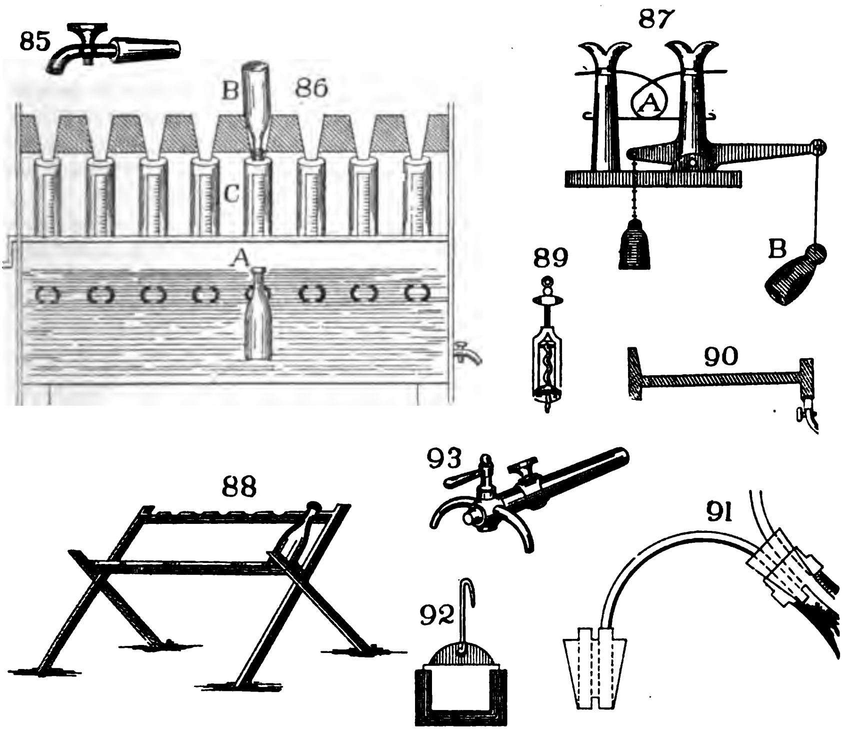
This work could be hastened by using a system of special faucets which allow us to fill several bottles at the same time without losing any wine, and which regulate perfectly the level which the wine should attain in the necks of the bottles. (See Fig. 94.) This system could be very profitably applied to the drawing off of wines and liquors, particularly of those which are in barrels; but in cellars whose space is often very limited it does not offer much advantage in comparison with the simple faucet, *particularly with a skilled workingman;* on account of the delays which are occasioned by the lifting of the barrel, this cannot be effected conveniently with this apparatus.

The barrels whose contents are destined to be bottled should be placed in cellars which are well protected from access of the air. They can be piled up two and even four rows high; the barrels of the lowest row should be placed on benches which are sufficiently high to enable the pan to be easily placed under the barrels.

In order to draw off the wine from the barrels of the lowest row into bottles, a pan for holding the bottles and receiving the drainings is placed under the barrel. After it has been stably placed on blocks of

wood, or on triangular blocks, the faucet is inserted; the socket should be first wrapped in a strip of linen and then driven in by gentle blows; care should be also taken to turn the nose of the faucet towards one side, in order that the wine should not fall perpendicularly in the bottles, and should thus produce as little foam as possible by gliding along the walls of the bottle. By operating in this way the wine is less affected by contact with the air.

The workingman, after having taken out the bung as gently as possible (with a gimlet, if the bung is cut off, never with the bung-starter or mallet, for the violent shock is apt to make the wine turbid, by dis-



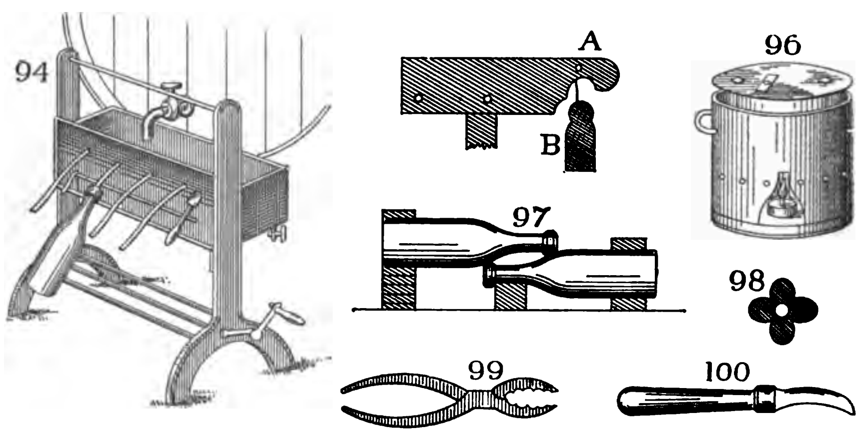
BOTTLING.

85. Stopcock used for bottling in Bordeaux.
86. Apparatus employed for decanting bottles (system of M. Vinean, of Bordeaux); *c*, zinc tube with graduated glass-scale; *b*, a bottle which is being decanted, placed on the funnel over a tube; the crank shown in the cut is used for emptying the water from the tubes into the basin; the leather arrangement can be replaced by stopcocks at the bottom of each tube if desired.
87. Machine for putting on capsules (system of Blanchard). This machine, which is a very simple one, is fixed to a table. In *a*, the neck of a bottle with its capsule is introduced; by pressing the footboard at *b*, the strings which surround the neck at *a*, contract. It is but necessary to impart a rotatory movement to the bottle and to push it at the same time forward in order to fix the capsule on the neck.
88. Bottle rack.
89. Corkscrew.
90. Extension tube and cock for filling the bottles from casks which are piled up in the fourth or fifth row.
91. Decanting corks, described in the text.
92. Rack into which a card may be placed designating the wine, when racked, etc.
93. Faucet of the pattern used in the Champagne; it has two nozzles and a double stopcock, the advantages of which are plainly apparent.

turbing the lees), sits down on a box or on a stool before the basin; he has within his reach a basket with empty bottles, which is slightly inclined towards the barrel to be drawn off; he lets a small quantity of the wine run into the first bottle in order to clear the faucet of the impurities which it may contain; he then puts this first bottle aside and begins the drawing off by placing separately each bottle under the faucet, which he opens. As soon as a bottle is full, he changes it rapidly without turning off the faucet, and regulates, at the same time, the filling of the bottles to the same level, which should be about one and one fourth inches distant from the aperture of the neck, if the bottles are corked with the "needle" machine, and two to two and one half inches for ordinary corking. In order to avoid the spilling of the wine into the basin, an inexperienced workman should open the faucet but little, and gradually he will acquire such proficiency as to enable him to leave it more and more open without spilling the wine. If the faucet is turned off every time after a bottle has been filled, not only the whole operation of bottling lasts much longer, but there is also imparted to the wine in the barrel an up and down movement which may cause the lees to rise.

In proportion as the bottles are filled, the workingman places them upright in a box which contains fifty pigeon-holes; this box should be within his reach or on the floor, which has been previously leveled and strewn with half an inch or an inch of sawdust or fine sand.

When the faucet ceases to run, the workingman has the barrel lifted by another workingman; this should be done very gently either by the hand, a screwjack, or by wooden wedges (compare the chapter on



BOTTLING.

94. Bottling machine (system, Farrow and Jackson). Described in the text.
95. Machine for putting capsules onto the bottles. This is a board of hard wood which is fixed to a table; it is cut out at *a*, in order to facilitate the introduction of the neck of the bottles. A string is introduced through a small hole in *a*, and fastened by a knot on the outside; the other end is connected with the footboard *b*. In order to adjust the capsule, the string is wound around the neck, the bottle is placed above *a*, and the footboard pressed down; then by turning the bottle and imparting to it a movement forward the capsule is fastened to the neck.
96. Stove for use in branding corks, model of Kepsig.
97. Bordeaux bottles, as shown in the cellar.
98. Trefoil. Instrument used in wiring sparkling wines.
99. Bottle forceps. This instrument is used to open bottles containing sparkling wine.
100. Book knife to assist in the preceding operation.

Description of Utensils). He should take the greatest care to see that the wine in the bottles, which are filled when the barrel is lifted, be always perfectly bright; if he finds that it is a little turbid in some, he should put these bottles aside to decant them when they shall have cleared.

In order to draw off the wine from the barrels which are piled up in the second and third rows, the basin is raised by placing it on empty boxes or barrels, but always in such a manner as to give the bottles an inclined position.

CORKS.

In former times very long and slightly conical corks were used for Bordeaux wines; in those days the corking was done by hand with a mallet. The great length of the corks was almost to no purpose, because on account of their conical form they did not fit perfectly in the neck of the bottle, excepting at the top near the ring; their lower end was scarcely pressed at all by the neck. To-day the practice of corking the bottles by machinery has become universal, and the shape, length, and the thickness of the corks have been modified. For the corking of extra fine wines shorter corks are used than in former times. (These corks are two inches long, are thicker, and have an almost cylindrical shape.) Their average diameter for small bottle necks is 0.8 inch.

These corks, which are forced into the bottles with the help of the piston of the corking machine, exercise on the neck a uniform pressure throughout their whole length; this pressure is also much stronger than that of the corks which are forced in with a mallet.

The conical corks, be they long or short, are used only in the absence of a machine and for corking wines destined for everyday use.

The various qualities of corks are the result of sorting. And, indeed, it is possible to find in the same piece of cork bark, portions which are more or less hard or porous. The cork manufacturers pick out the least porous and the most supple corks. This first picking over is followed by several others. The corks of the first picking are the soundest and the most supple; they form the quality which is styled *extra fine*. Notwithstanding these repeated sortings, rarely a perfect cork is found; that is, one which is free from visible pores.

The ordinary non-assorted corks, and particularly those which have been rejected in sorting, are hard and very porous; they break more bottles than the supple corks, and if they are too porous the dust which they contain in their pores enters the wine, makes it turbid, and may also impart to the same a disagreeable taste. Aside from that, the ordinary corks sometimes allow the liquid to ooze out. For this reason they should not be used in the corking of fine wines, for, in the end, it would be more expensive to use them instead of extra fine corks, owing to the loss of wine, to the breakage, and to the bad taste which they might impart.

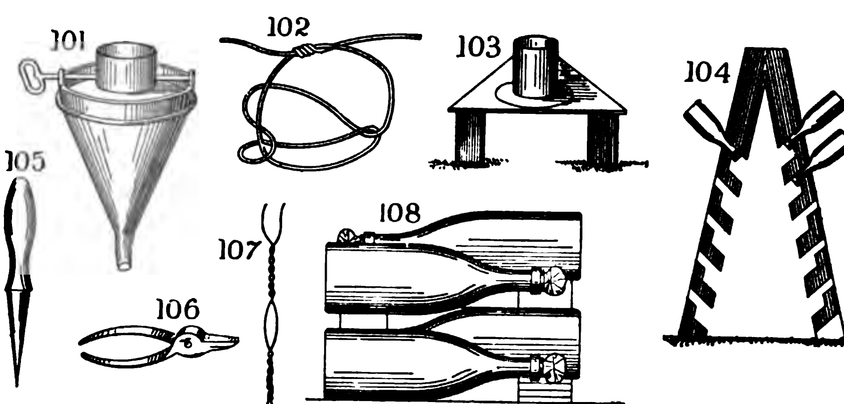
Preliminary Treatment of the Corks.—Before using the corks which are destined for corking by a machine, care should be taken to render them more flexible by soaking for several hours in water of ordinary temperature, or rather by allowing them to remain for two or three hours in boiling water; they are afterwards allowed to drain, and before being used they are again soaked, but this time in the wine which is to be bottled. If it is desired to give to the new corks the appearance and

vinous color of the corks which have been used in corking old wines for several years, they should be soaked in boiling wine for four or five hours. Before using them they should be again soaked in wine.

Whatever the preliminary treatment of the corks may be, either with cold or with hot water, or with wine, their introduction into the neck of the bottles is facilitated by dipping them into brandy before using them. This treatment makes them more slippery.

Steaming the Corks.—Steam penetrates much easier than hot water into the pores of the corks. An apparatus for steaming corks can be rigged up without expense and very easily. The simplest and most convenient arrangement for steaming a small quantity of corks is given in the following:

An ordinary boiler of copper or of any other metal, which should be sufficiently deep, is fitted with a wooden cover; the wine or water is poured in, so as to reach a height of four inches, and above the surface of the liquid a wooden or metallic grate is placed; this grate rests on four legs, and is destined to prevent the immersion of the corks in the liquid, but to allow the steam to circulate freely; the corks are now placed on the grate, and the boiler covered and heated. As soon as the liquid begins to boil, the steam rises and enters the pores of the corks and softens them considerably; they are allowed to remain in the boiler from two to four hours.



101. Funnel according to M. Mosach.
102. Knot fastening in the cork of ordinary and sparkling wines.
103. Case prepared to hold the bottles while wiring corks.
104. Stand for storing bottles neck downwards—useful for sparkling wines.
105. Knife with double edge.
106. Pinchers for cutting and binding wire.
107. Wire twist and loops.
108. Manner in which the bottles are stored in the Champagne District.

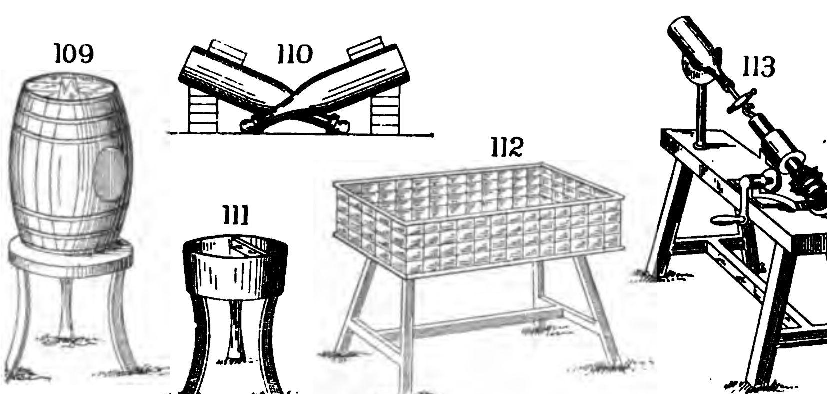
SEALING BOTTLES WITH WAX.

If bottled wines are destined to age in the cellar, or to be placed in pigeon-holes in buildings, which are free from humidity, and if they have not to remain there longer than one or two years, it is possible to dispense with the sealing. Thus an amount of extra labor is saved when they have to be sent off, because it is the rule to send off the bottles capsulated; it would be necessary to remove the wax before putting on the

capsule. But when the cellar is very moist, and when very costly wines have to be stored for several years, the sealing wax protects the corks from the influence of the humidity, which would make them rot rapidly; and also from the attacks of insects, which sometimes gives rise to loss by leaks.

To Prepare the Sealing Wax.—In order that the sealing should be effective, it is necessary that the wax or mastic which is used should be very adherent, fat, unctious, and not brittle. Most of the sealing waxes for bottles which are found in the trade are too dry and too brittle for this purpose. The best sealing wax is made from gallipot (a white, viscid resin). It is prepared by fusing the resin in a saucepan on a slow fire. This fusing should be watched attentively, for it is liable to foam and to rise over the rim of the pan unless it is incessantly stirred and taken from the fire at the right time. When the resin is well fused, the impurities which it contains are removed, such as fragments of cork and chips of pine wood. Then a little tallow is added in order to make it fatter; about three hundred grains of tallow to a pound of resin are used. This sealing wax is used without the addition of coloring matters. Its natural color is russet. It should be kept constantly hot, without, however, heating it to boiling during the operation, which consists in quickly dipping in the necks of the bottles, whose corks should be dry. It is unnecessary to cover much of the neck with the wax. As this operation is performed only to protect the corks, the wax should not go below the ring. Thus labor is saved when the wax has to be taken off in order to put on the capsules for sending them off. In case gallipot cannot be obtained, resin in the form of cakes, or the mastic tablets which are found in commerce, should be used. The cakes or tablets are broken before being put on the fire, and about three hundred grains to an ounce of tallow per pound of the resin are added.

Coloring the Sealing Wax.—If, in making the sealing wax, the tallow is replaced by unbleached wax, a mastic is obtained which is more brill-



109. Disgorging cask. The sediment being discharged into the hole shown in the side of the barrel.
110. Improved stack for bottles.
111. Tub for corks removed from bottles, provided inside with a wire net on which the corks fall and drain.
112. Basket for corks.
113. Apparatus for uncorking and emptying champagne bottles, the working of which is plainly shown in the figure.

iant and finer than that into whose composition tallow or stearine has entered. Various colors may be imparted to the wax according to necessity—red, yellow, black, blue, green, etc.; since the use of the capsules has become general colored wax is seldom used for sealing the bottles which have to be transported. The quantity of the colors used is on the average one ounce to every two pounds of sealing wax; the color is put in the hot wax, which, however, should not boil, and it is mixed in gradually, stirring the whole with a spoon of galvanized iron or with a wooden spatula. Wax is colored red (the color, by the way, which is most frequently used in commerce) with *cinnabar;* deep red is obtained by means of *red ochre;* the yellow with *orpiment* (sulphide of arsenic); deep yellow with *yellow ochre;* black with *animal charcoal;* blue with *Prussian blue;* green is produced by a mixture of equal proportions of the blue and yellow colors. The poisonous colors, such as cinnabar and orpiment, can be replaced by the ochres, which are perfectly harmless; their color, however, is never so brilliant.

TREATMENT OF THE BOTTLED WINES.

The bottled wines are liable to undergo various alterations. These are: 1. The acquiring of the "working" taste; 2. Voluminous deposits and loss of transparency; 3. Bitterness; 4. Roughness; 5. Sliminess; 6. Decomposition and putrefaction. Most of these defects can be ascribed to the fact that the condition of the wine which was bottled was bad, or, in other words, that the wine was too young; its after-fermentation was not over, and it was not perfectly bright. These defects are also caused by extreme variations of temperature, or, lastly, by too great age.

Taste of "Working."—The taste of "working" is due to the presence of carbonic acid in the wine. This acid is produced by an untimely fermentation which starts in wines still containing mucilaginous substances, ferments, and saccharine matters. The after-fermentation of wines which contain such matters is consequently not over, and is completed in the bottles. The same influences which start the fermentations of wine in wood, such as contact with the air, the rising of the temperature, etc., act on the bottled wine.

These alterations can be prevented by avoiding the bottling of wines which are too young, or not perfectly bright, and when they are bottled by protecting them absolutely from the access of the air, by corking the bottles hermetically, and by storing them in places which have a constant temperature.

The sweet and simply mellow wines which contain saccharine matters, whatever their nature may be, are liable to ferment in the bottle, particularly if they are submitted to a high temperature, and if their alcohol-percentage does not exceed 15 per cent.

The non-sparkling wines which ferment in bottles should be transferred back to the barrels, and afterwards treated in a special manner (compare *Treatment of Faulty Wines*). The fermentation may be partly stopped by placing the bottles upright in a cool place, and leaving them in this position for at least two days; afterwards, they are opened for an hour or so in order to give an outlet to the carbonic acid gas; but this operation is but palliative, and does not correct the evil. In the majority of cases these wines are turbid, and then it is advisable to put them back into wood.

Voluminous Deposits—Loss of Brilliancy.—After having remained for some time bottled, the wines form more or less sediment according to their quality, to their age, and to the brightness of their condition, possessed at the moment of their bottling. The character of the sediment varies also according to the variety and age of the wine. These sediments or lees consist mostly of coloring matters and organic and mineral salts, which, after having become insoluble, are precipitated by their own weight to the bottom of the liquid.

Sometimes the sediment adheres to the walls of the bottle. In certain wines it has a muddy consistency and does not adhere to the glass. Sometimes, also, the sediment appears like gravel, particularly if the wine contains a great deal of tartar (bitartrate of potash). Several things hasten and promote the formation of sediments. Sediments often reach a considerable volume after a few years in wines which were bottled too young, or in those which were blended with wines of a different character. In wines dating from good years which have not been

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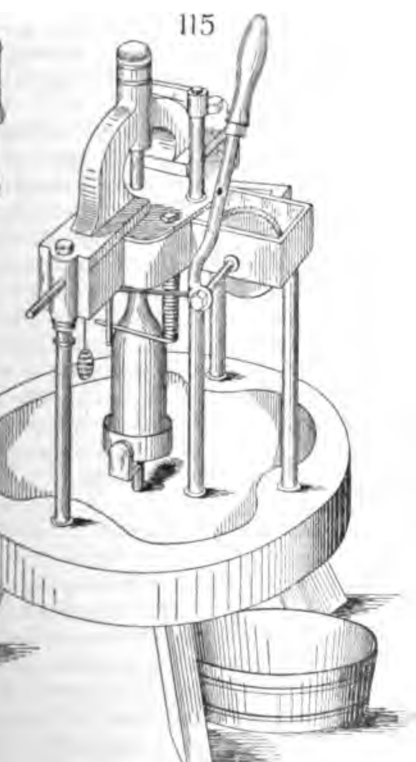

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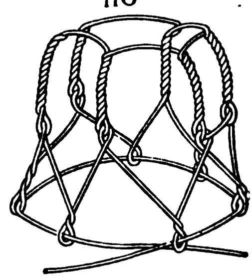

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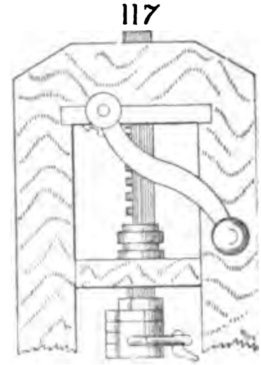

114. Champagne bottle corked with the machine of Maurice, and the clasp specially used with this machine to replace tying by the ordinary method.
115. Machine for corking sparkling wines, by the Maurice system.
116. Cowl for tying in the corks of bottles with sparkling wine, according to Adrien de Mestre, of Bordeaux. This system is used for corking champagne bottles.
117. Bordeaux machine with jointed tube—system of Mestre—for corking sparkling wines.

blended with other wines, made from a good variety of grapes, carefully treated, and bottled under normal conditions, a sediment is hardly deposited after two or three years from the date of the bottling. Frequent moving of the bottles, however, long voyages (particularly if the corking had not been done by means of the bottling machine), variations of temperature, and the decomposition of the wines which have become too old, increases the sediments by precipitating a portion of the color and of the salts in solution.

If the sediment is voluminous, it is apt, in the long run, to impart to the wine a bitter and harsh taste or the taste of the lees. It is therefore very important to separate this sediment from the liquid, particularly in the case of fine wines. This can be done by decantation. If there is not much of a sediment, and if the wine is of a high quality and has not acquired any bad taste, it should be avoided, for this operation causes the wine to lose some of its bouquet—particularly if done without the necessary precautions.

These observations apply to bottled wines which have deposited some sediment, but which nevertheless preserve their limpidness, the brilliancy of their color, and brightness. As for wines which become and remain turbid in the bottles, it is absolutely necessary to fine them; and as it would take too much time to perform this operation in the bottles, the wine has to be transferred back to the barrel.

Bitterness—Roughness.—The most usual cause of these defects in bottled wines, if not due to the sediment, is the loss of their fruity and mellow taste; it is then a sign of a beginning decomposition. It is rarely that this defect does not increase with time. The only remedy, if the wine so affected is of high quality and has not lost its bouquet, is to blend it with younger wines which are mellow and perfectly clear.

Sliminess.—Sliminess is an alteration which develops in wines containing but little tannin. This defect occurs chiefly in white wines which have been bottled when not perfectly clear, and which contain nitrogenous matters in suspension. The slime in the bottled wines can be destroyed by the same means which we have indicated for wines in wood (compare *Treatment of Faulty Wines*). If the wine has lost much of its quality it is necessary to put it again into barrels and blend it with wines of the same character, but which are younger.

DECOMPOSITION—PUTREFACTION OF WINES.

Wines in bottles keep and improve in quality if they are suitably treated, that is, so long as their component parts remain united and soluble, but after a lapse of time, which varies according to their special character, they begin to lose in quality. This decomposition is indicated by many signs, appearing sometimes in advance, particularly in the case of wines of high quality. These signs are: loss of the oily and fruity taste, further bitterness, and sometimes roughness. After the lapse of several years, it may be observed that the bouquet loses its sweetness, and that the wine acquires a "*rancio*" taste, which covers its natural flavor. The wine also loses its color rapidly, and deposits a sediment which is much more bulky than that which is formed during the first years after bottling. Lastly, when the decomposition is rather advanced, the wine acquires a slightly putrid odor.

On the average the fine wines of the Gironde, which date from a good

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118. Method of corking according to Mestre, applied to Bordeaux bottles.
119. The Mestre system applied to alcoholic liquids.
120. Champagne bottle provided with the clasp 116, and the capsule of Mestre.

year, improve in quality after the first two years after bottling; the wines which are deficient in body and are delicate, begin to deteriorate even before this length of time; the full-bodied wines, which take naturally a longer time to develop their qualities, keep a much longer time; there have been examples of such wines which have preserved their qualities in bottle as long as ten years; but as a rule, after having remained three years in the wood and the same length of time in bottles, they have attained the maximum quality they are able to acquire.

As soon as it can be noticed by the taste that a high-priced wine has attained its full development in the bottle, it should be cautiously decanted into bottles which have been rinsed with the same wine, and these bottles should be closed with *ground* glass stoppers.

Certain wines, such as those made from the first crop of *Petit Verdot des Queyries*, the first quality Saint Emilion, first quality Barsac, and Sauterne, keep a much longer time. The loss of color, together with the abundance of sediment, which is a constant sign of deterioration in the wines of the Gironde, should not be interpreted in the same sense for all kinds of wines.

Thus, the red wines of Spain or the sweet wines of Roussillon, which possess a very deep color as long as they are young, lose their color, almost entirely, after having been bottled three or four years; they assume a golden yellow color, without, however, deteriorating; but in these wines, whose alcohol-percentage exceeds fifteen, it has been observed that the sediment is not so considerable in proportion to the color which has been precipitated as in French wines, and that the coloring matter remains sticking in all directions to the inner sides of the bottles instead of sinking to the bottom.

The alcohol and tannin are the preserving principles of the wine; it follows from this that the more abundantly a wine is provided with these substances the longer it will keep.

The origin of the deterioration of wines is the dissolution of their component elements, which become thus insoluble and are precipitated. The loss of tannin, which is transformed in time into gallic acid, removes from the weak wines their most effective conserving element, and causes

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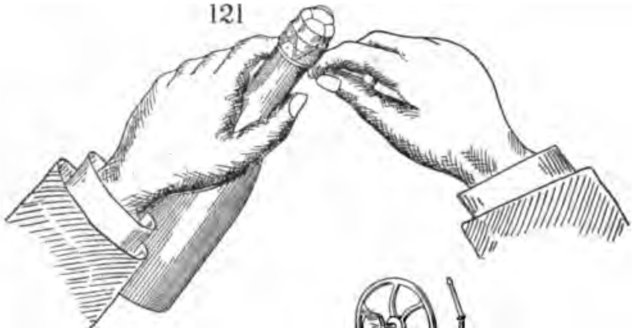

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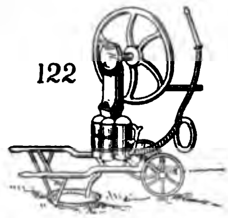

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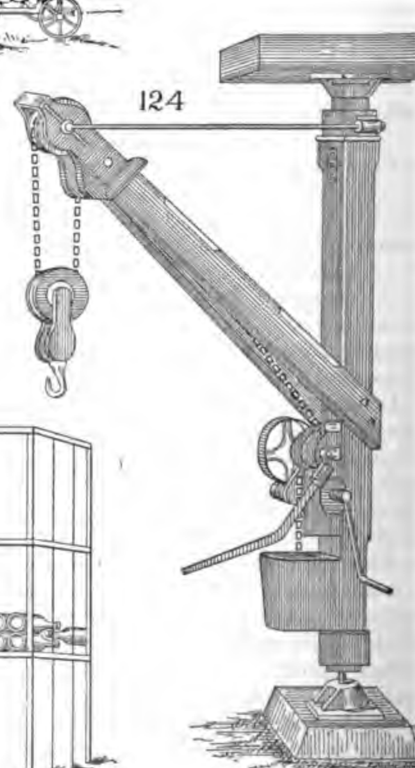

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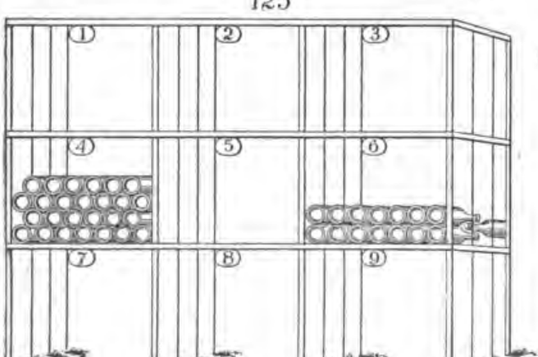


121. Uncorking of bottles which have been corked according to the Mestre method.
122. Portable pump for transferring wine from one cask to another. System, A. Suc.
123. Pigeon-hole bottle rack of corrugated iron, each pigeon-hole receiving one bottle. These pigeon-holes offer the advantage of enabling one to take out one or more bottles without moving the rest. They, however, occupy much more room than the racks shown in Fig. 125.
124. Turning crane. System, A. Suc.
125. Spaced rack. These contain three hundred and twenty-five bottles, or a barrel of wine each. The bottles are stored away with the help of boards, which are placed between the layers; they are of the same length as the spaces partitioned off.

a precipitation of the coloring matter. In support of our assertions it has been observed in practical work that wines which contain tannin in large quantities have the advantage of keeping much longer than wines which have the same alcohol-percentage, but which are poor in tannin. We have, therefore, good reason to believe that the transformation and loss of the tannin is one of the chief reasons why wines degenerate. What science has not explained up to this day, is the cause of putrefaction in the last period of the degeneration of bottled wines—wines which are too old or poor in alcohol; the cause of the transformation and decomposition of their alcohol without any contact with the air. True, it is a known fact that putrefaction starts in only in wines which are very poor in alcohol (below 8 per cent), and which have remained a long time in the bottles, and after the coloring matter and the salts which are contained in the wine have already begun to separate out; but what has not yet been explained is, as we have already said, the cause of the decomposition of the alcohol.

CONCLUDING REMARKS—GENERAL PRECAUTIONS.

In order to prevent the defects which bottled wines may acquire, the following precautions should be taken:

(1) Only those wines should be bottled whose after-fermentation and clearing have been completed.

(2) The moving of the bottled wines should be avoided as much as possible. They should also be protected from changes of temperature by storing them in specially constructed cellars.

(3) They should be freed from their sediments at the proper time by decantation, but this means should not be adopted unless the sediment is voluminous, or unless it has imparted to the wine a bad taste, as by this operation it loses unnecessarily a part of the bouquet and strength.

Decantation.—Decantation is an operation which has for its object the separation of the clear portion of the bottled wines from their sediments. In order to perform this work in the right manner, certain precautions should be used; contact with the air should be particularly avoided. Experience has shown that wines which are decanted when the air has access to them (we speak here of fine wines), have less bouquet, and are weaker in alcohol, than wines of the same character which have not undergone this operation.

The bottles should be taken out from the pigeon-holes without either changing their position or shaking them, in order not to disturb the sediment. To perform this operation easily, they are placed in a slightly inclined position in special baskets, which hold five to six bottles, so that we may uncork them without spilling the wine. These baskets have a partly open bottom, so that they may be placed on a frame or trestle; then with the help of a candle, which is placed below, the movement of the sediment may be followed. We are going later to describe these baskets more in *detail*. If such baskets cannot be procured, the bottles are moved just as they were laid down onto a rack.

After allowing them to rest a longer or shorter time, according to the consistency of the sediment, they are uncorked without shaking, by means of an *English* corkscrew, and the wine decanted slowly into clean bottles which have been previously rinsed with decanted wine. The bottles which have been emptied can be used again after having been rinsed with

plenty of water, and after draining and rinsing them with wine which is similar to that decanted. If it is a wine which shows signs of beginning decomposition the bottles should be rinsed with old brandy. Decanting can be done by hand in the following manner: On the empty bottle a small funnel with a trellis is placed in order to avoid the introduction of impure matters; the bottle is then slightly inclined after having first wiped the orifice, and with the help of a lighted candle, which is held below, the movement of the sediment is followed. When the clear portion of the wine has run off, the bottle is filled completely with wine which has been already decanted, and immediately corked. The decanting should be done in the cellar, and never in work-rooms through which the air circulates freely.

CHAPTER V.

RATIONAL TREATMENT OF FAULTY WINES.

Faulty wines; general considerations. Natural defects. Earthy tastes; means of preventing this defect. Tartness; how to prevent and destroy the same. Harshness; its nature and causes; how to prevent an excess of harshness, bitterness, and the taste of stems. Acidity; hot taste; means of preventing acetic fermentation. Insufficient alcoholic strength. Lack of color; dull, leady, bluish color; taste of lees. Putrid decomposition. Faults or diseases of wines which have been contracted after the fermentation is over. Acidity; pricked wines; roughness; means of preventing acidity; treatment of pricked wines. Taste of the cask; moldy taste; bad taste produced by foreign matters; slime; bitterness; roughness; taste of "working" of the lees, etc. Degeneration; putrid fermentation of wines.

FAULTY WINES.

By this name are designated wines which possess some natural or acquired defect, or which show the beginning of an alteration. From the commercial point of view, by *defect* or *fault* are understood the changes which a wine has undergone after its fermentation, and which are mostly due either to the non-observance of necessary precautions concerning its preservation, or to the poor state of the casks.

The natural defects are not considered in the trade to be real defects.

We divide the different kinds of defects and diseases into two classes:

1. Defects which are due to the nature of the soil, to the fertilizers which were used, to a deficient maturity of the grapes, to unsuitable processes of vinification, to the prevalence of ordinary varieties. It is evident that the defects which belong to this class must be innate to the wines at the time of their leaving the fermenting vat; these defects are the following: Earthy taste, acidity, harshness, bitterness, taste of the stems, hot taste, low alcohol-percentage, lack of color, dull, leady, bluish color, taste of the lees, and tendency to putrid fermentation.

2. The defects contracted by the wine after its fermentation, the majority of which are due to carelessness, or to the bad condition of the casks, are: flatness, moldiness, acidity (pricked wine), taste of the cask, bad taste produced by accidental introduction of foreign soluble substances, slimy condition, bitterness, harshness, taste due to the "working" of the wine, decomposition, and putrid fermentation.

GENERAL CONSIDERATIONS.

Before indicating the means which should be applied in correcting, destroying, or diminishing the defects of wines, I would say, that a faulty wine, whatever its defect may be, particularly if a bad taste is very prominent, will never be equal to a wine of the same kind which was sound from the beginning, even after complete elimination of the defect. It is, therefore, more prudent and wise to prevent the diseases of wine than to wait until the wine becomes faulty and then attempt to cure the defect. It is to the interest of the wine maker to use all the means which are in his power to remedy the natural defects of the wines which he produces.

As far as the wine merchants and consumers are concerned, they should refuse to buy faulty wines, particularly if they make a purchase without having immediate use for it; not only because these wines, notwithstanding their low price, cost more than they are really worth, but also because they lose in quality on aging instead of improving. Thus, by keeping them in the cellar one is exposed to the danger of losing, not only the interest, but also a part of the capital which he has invested in their purchase. Besides, if a wine has a too prominent defect it is only seldom that it is possible to use it alone; either because it is too poor in alcohol and in color, or because it is no longer possible to entirely eradicate the defect. Besides, it would be an error to believe it possible to hide the bad taste by distributing the faulty wine through a large number of barrels of sound wine. The way to do is to destroy or to diminish, first, the defect, by treating each cask separately by a suitable method, and then by blending the wine with the most ordinary brands which are at hand.

In speaking of each kind of defect in particular, we are going to describe its nature, its origin, and the means which should be employed to prevent, diminish, or destroy it. Everybody can ascertain the action of the remedies which we propose by experimenting on a small scale, say with a quart or a fraction of a quart of the faulty wine; the sample should then be well corked and kept in a cool place for at least two days in ordinary cases, and for eight days if it has been previously treated with finings. The quantities of the different correctives which we advise are for one barrel containing fifty gallons. As the quantities which have to be used on fractions of a quart are very small, they can be weighed out accurately only with the aid of a small laboratory balance.

NATURAL DEFECTS.

Earthy Taste.—This natural defect is a bad taste which the pulp and the skins of the grapes acquire before fermentation; it is met with in wines which are made from grapes grown on moist, swampy soils, and particularly if such soils have been fertilized too strongly, or if substances have been used as fertilizers which are liable to impart their character to the sap.

Proper Means for Preventing the Earthy Taste.—The crops from young vines which are growing in moist soils have a stronger earthy taste than those of old vines which grow in the same soil, and this taste is generally more prominent in prolific and ordinary varieties than in nobler varieties. Sometimes it is possible to destroy or diminish this

defect by proper drainage; by allotting more space to the vines; by artificially cleansing the soil, and by avoiding the planting of trees in the neighborhood. If it has been found that this taste is due to a too abundant use of manures, a smaller quantity of these substances should be used, and less wood should be left on the vine. Lastly, a great deal of attention should be paid to the drawing off of the young wine. The murk should be drawn off as soon as the fermentation has gone through, for a long contact of the liquid with the stems and skins only increases the bad taste.

How to Destroy or Diminish the Earthy Taste.—The treatment of wines with earthy taste differs according to their prominence, their character, and their possible future; but the condition necessary for all of them is that the insoluble substances should separate out rapidly, and that the wine should never be allowed to remain long in contact with the lees. These wines should be drawn off as soon as they have become clear, and they should be also frequently racked to avoid the formation of voluminous deposits.

The red wines which, notwithstanding this defect, promise to develop good qualities in the future, should be racked the first time in the beginning of the winter, again in the first days of March, and should be then fined (after this second racking) with the white of about eight eggs; they should be racked again after a contact of a fortnight with the finings.

If we have ordinary red wines possessing this defect, which are of little promise, whose color is dull and deficient in depth, and which are lacking also in alcohol, they should be treated in the same manner; but before adding the white of eggs, they should be fortified with alcohol of 60–90 degrees, in proportion of one quart per barrel, in order to facilitate the coagulation of the albumen.

If the wines made from marshy, low lands are strong and rich in body and color, and have to be treated for the same defect, an excellent result will be obtained by an energetic fining with two ounces (about two tablets) of gelatine per barrel.

White wines with an earthy taste should, before being racked, be entirely through with their fermentation, and should also have received an addition of seven tenths of an ounce of alcoholic tannin solution per barrel, or an equivalent of white wine which has been treated with tannin. After the first racking, they should be treated with two ounces of gelatine. This racking and fining precipitates the insoluble matters and a portion of the coloring matter, which is strongly contaminated with the earthy taste. Thus this taste is sensibly decreased. If the earthy taste is not very strong, it disappears gradually after each racking. Should the earthy taste be very strong, it is advisable to beat the wine with one pint of olive oil per barrel. After having stirred the mixture well, the barrel should be filled up completely and the oil removed; the latter, by its contact with the wine, takes up a portion of the essential oil which is the cause of the bad taste. After this treatment the wine should be fined in the same way as has been described above.

Tartness, Its Nature and Origin.—The tartness of wines is due to the presence of an excess of tartaric acid. This acid imparts to the wines a sourish, harsh taste. The wines which are affected with this

defect contain also another organic acid, but in smaller quantities—*malic* acid. In tasting such a wine these acids produce in the palate a disagreeable sensation, and like unripe fruits they set the teeth on edge.

The origin of this tartness is to be found in the imperfect maturity of the grapes. It is well known that tartaric acid abounds in most unripe fruits and that it disappears only at the period of maturity, when it becomes transformed into glucose (fruit sugar) under the influences of solar heat.

Thus, a tart wine is an imperfect wine which, besides this defect, has generally some other defects; such a wine is often poor in alcohol and body, and defective in flavor, bouquet, and color. This is because the grapes, which are not completely ripe, contain much tartaric and malic acids, little fruit sugar and mucilaginous substances, and because the substances which are destined to color the skins, as well as the aromatic compounds, have not been completely formed.

MEANS OF PREVENTING TARTNESS.—We refer the reader to the article on "Vintages in Cold and Rainy Years," in which we have indicated the different means which should be used to counteract the inclemencies of the seasons. Then we have detailed how to avoid the making of tart wines, *without using sugar or other substances foreign to the grapes, and without using alkaline materials to neutralize the tartaric acid in the must.*

The artificial means of improving the must are indicated in the article on *artificial wines*, in which we have made the reader acquainted with their various uses and inconveniences (compare the first volume of this work, *Vinification*).

HOW TO DIMINISH OR DESTROY TARTNESS.—The treatment of tart wines differs according to the quantity of tartaric acid it contains. If the tartness is not unbearable, the wine can be improved by adding one or two quarts of old brandy to each barrel..

The wine contains more tartaric acid after leaving the fermenting vat than after the second slow fermentation in the barrel is through; this can be explained by the fact that the free tartaric acid combines with the tartrate of potash which is contained in the wine, and forms with the latter a new salt, the bitartrate of potash (cream of tartar), which settles down with the lees or adheres to the walls of the cask. The result is that the wine is less tart after the first racking than when it is new; but if the tartness of the wine has attained a very high degree, it will be retained even when the after-fermentation is over. This acid can be neutralized by adding to the wine a convenient quantity of tartrate of potash. This salt will combine with a part of the tartaric acid, and form cream of tartar (bitartrate of potash), and after a few days of rest the wine will be less tart. The quantity which should be used is half a pound to a pound per barrel. In order to apply it, some gallons of the wine are drawn off, and the tartrate of potash, a handful at a time, is thrown into the barrel; the whole should be well stirred, exactly in the same manner as when the wine is fined.

This process is not a new one. It was proposed in 1826 by M. A. Julien, who saw it in use in the neighborhood of Paris. In cold and rainy years certain wines are so tart that it becomes impossible to destroy their tartness by blending them with well matured wines; for if a wine is too tart, and if in order to improve it it is blended with well matured

wines, it appears indeed as if the acid had been partially destroyed as soon as the blending has been done; but after a few days the superabundance of the tartaric acid ends by attacking the good wines, which have been thus sacrificed to improve the poor ones.

It is, therefore, more advisable to neutralize the acid by tartrate of potash. It should be added, however, that the practical application of this method has not yielded such good results as one would expect considering the theory only. I have often experimented on very tart wines and have used as much as thirty to forty-five grains of tartrate per quart, but did not succeed in diminishing their extreme acidity appreciably. We insist, therefore, that the wine maker should do his utmost to prevent this defect. As far as the wine dealer is concerned, he should avoid buying wines which are too tart and which have no future.

The tartaric acid could be also neutralized by alkaline substances, such as the bicarbonates of lime, soda, or potash. By following this method it would be easier to discover the excess of acid, than in any other way; but by neutralizing the acid soluble salts are formed, which remain in the wine, and which may have a bad influence on its hygienic properties. We won't speak, therefore, of this kind of treatment.

HARSHNESS.

Its Nature and Causes.—The harsh taste is due to the astringent nature of the tannin. If an excess of the latter is contained in the wine, it imparts a harsh taste to it. Tannin is useful in preserving and fining wines; wines which contain much tannin keep longer without degenerating, and endure transportation better than those which have none, provided their alcohol-percentage is the same. From medical science we learn that wine which contains tannin is more wholesome than wine which does not contain any, for tannin strengthens and tones up the digestive organs. That portion of the grapes which contain most tannin are the seeds, the skins, and the stems. Harshness is not a defect; it is rather an excess of good quality, particularly if such wines have no after-taste of stems, no earthy taste, no bitterness, nor acidity; if their alcoholic strength is considerable, if they have a good fruity taste, and good color; such are, for instance, the first wines of Palus, Queyries, Bassens, etc., which are made from the grapes of pure Verdot. These wines are harsh on account of the excess of tannin, but valuable in aging, preserving, and blending wines which are deficient in body and too weak to keep a long time without degenerating. Wines which contain much tannin keep a long time; they are, however, afflicted with the drawback of developing very slowly. The harshness decreases with time, because the tannin is gradually transformed into gallic acid. The continuous motion during a long voyage hastens this transformation. Aside from that, the tannin is precipitated by several substances which are contained in the wine, and by certain finings; thus, by its separating out of the wine, the tannin hastens its clearing.

Means of Preventing an Excess of Harshness.—We should never attempt to destroy the harshness of wines which are mellow, weak, and low in alcohol, because, if once the tannin is removed from them, not only their keeping qualities would diminish, but they would also

require a much longer time to clear; in the end they would also have less color. An excess of harshness is prevented in strong and richly colored wines by stemming the grapes which are used, and by drawing the wine from the pomace at a suitable time; if the young wine is allowed to remain too long a time on the pomace, its harshness is liable to increase.

HOW TO DESTROY THE HARSHNESS.—As soon as the wine is in the barrels, its harshness begins to increase, owing to the tannin which is contained in the oak wood of the staves (if the barrels are new); but when the after-fermentation is over, and when the first and most voluminous portion of the lees has subsided, it becomes less harsh, because a portion of the tannin has been precipitated by the vegetable albumen, and by other substances which are contained in new wines. If the quantity of tannin is great, the harshness continues for several years.

If the wines are full-bodied and possess a fine color, their excessive harshness can be destroyed *by precipitating a part of the tannin;* for this purpose it is sufficient to add a good dose of gelatine (two ounces, or approximately two tablets).

It should not be forgotten that when tannin is precipitated, at the same time a portion of the color is also destroyed; this method should be therefore avoided in dealing with pale red wines, and should be only applied to wines which are rich in color and very harsh, and which would require too long a time to develop in the natural way.

BITTERNESS AND TASTE OF STEMS.

Bitterness is a disagreeable taste, which is produced in the new wines by the solution of a bitter substance which is contained in the grape bunches. This substance has nothing whatever to do with tannin. Sometimes this bitterness is due to the cortical portion of the seeds of certain varieties of grapes.

This bitterness decreases in the wine in the proportion as the settling of the lees progresses. The bitterness is prevented by allowing the grapes to mature completely, and particularly by stemming them with care, and not letting them remain too long in the fermenting vat. In order to overcome bitterness the wine must undergo the same treatment as in the case when it is desirable to destroy the earthy taste; afterwards, to each barrel one quart of old brandy should be added.

We now speak only of the bitterness of new wines. The bitterness of old wines is due to an entirely different cause, and requires other measures. We are going to speak of it later.

THE TASTE OF STEMS, which is often associated with bitterness, is due to a prolonged immersion of the grape bunches in the murk. It is presumed that this defect is due to an aromatic substance in the stems. It can be prevented by stemming the berries. Like the natural bitterness, it decreases with time. The remaining of the murk on the pomace in the fermenting tanks beyond a reasonable length of time is one of the chief reasons for the taste of stems and bitterness.

ACIDITY—HOT TASTE.—This defect is due to the presence of acetic acid in the wine. Every wine, even the most mellow, the best made,

and the best cared for, contains acetic acid, but in such small quantities that it is not appreciable to the taste.

The acetic acid is formed in the wines during and after vinification in open vats. Its formation is owing to the contact of the air with the cap. The cap is formed by the ascension of a portion of the skins and stems, which the bubbles of carbonic acid carry to the surface of the must. The alcoholic fermentation ceases very soon in this cap when it has once come in contact with the air, and the alcohol soon becomes transformed into acetic acid by means of certain ferments. This change proceeds so rapidly that in cases when the must is allowed to remain in the fermenting vat too long a time, and the temperature is high, the acid condition of the cap passes into putrid.

So long as the first violent fermentation is going on, carbonic acid is evolved; the bubbles of the latter raise the cap to the surface of the must; but as soon as the heat of fermentation has subsided, the cap sinks down into the wine and imparts to it the acidity which it had acquired from contact with the air.

Means of Preventing Acetic Fermentation.—Acetic fermentation can be prevented by various means:

1. By fermenting the must in covered tanks, so as to prevent the access of the air and to compress the carbonic acid; also, by avoiding the formation of the cap by means of a frame.

2. Should the fermentation be conducted in open tanks, it will be advisable to have them only three quarters full, so that a layer of carbonic acid, which is heavier than air, protects the cap from all contact with the air; the cap is also sometimes covered with a layer of straw as soon as it begins to form.

3. By watching the contents of the fermenting tanks, and by pressing the murk as soon as the fermentation has ceased.

Treatment of Wines Which Have Become Pricked During Fermentation.—It should not be expected that such wines may improve with time. It is possible to make them palatable, but still their future is lost. This is the reason why it is the direct interest of the producer to prevent this defect by all possible means.

These wines should be racked off as soon as possible from the first lees; that is, as soon as the generation of carbonic acid has ceased. If they are still turbid, their clarification should be hastened by an energetic treatment with finings, and they should be left in contact with the finings only the necessary space of time. Then they should be racked. The object of this preparatory treatment is to free them from a portion of the acetous ferment which they contain.

Insufficient Alcoholic Strength.—This defect is due to the watery nature of certain kinds of grapes, and to the small amount of sugar which they contain. It is peculiar to wines which are made from grapes which come from young vines, for it is an established fact that young vines which grow in fertile soils, or long pruned ordinary varieties, produce an abundance of watery grapes with large seeds. When the wines whose alcohol-percentage is low are not well supplied with tannin and coloring matter, they degenerate quickly. This may happen even in their first year, before the lees have time to settle completely.

The deficiency in alcohol is prevented by planting in rich soils varieties only which are well supplied with sugar and tannin, such as the two varieties of Verdot, and the two Vidures. These produce full-bodied, strong wines, which possess good keeping qualities, and improve regularly with time.

The treatment of weak wines consists chiefly in freeing them as quickly as possible from the ferments which they contain, in order to prevent further acetic and putrid fermentation, which they are extremely liable to undergo. This result can be obtained by racking as soon as the lees have settled. If the wine should still remain turbid after the second racking, it should be treated with the white of six eggs per barrel. The coagulation of the albumen may be facilitated by adding to the wine, before the fining, from a pint to three quarts of alcohol (90 degrees) per barrel, and to the white of eggs add a handful of common salt in a glass of water. As such wines are not of much promise for the future, it is necessary to blend them with strong wines which are rich in body and color. The practice of fortifying with alcohol is not advisable in this respect. It is true the spirits which are added increase the alcoholic strength of the wines, but they remain dry and without a fruity taste; whereas, if blended with strong and fruity tasting wines of the same character, they acquire alcohol and a mellow taste at the same time.

LACK OF COLOR.

The color of the grapes in most instances arises from the skins of the berries. These colors are yellow and blue in the red grapes, and merely yellow in white grapes.

The natural color of the skins of the red grapes is, as we have said before, a mixture of yellow and blue. The acids have the property of changing the blue vegetable colors into red, such as litmus, orchilla, etc. The blue color of the grapes undergoes materially this chemical change by contact with the organic acids in the pulp, which dissolve in the must during fermentation (tartaric, malic, and acetic acids).

The pulp of most red grapes is colorless. If the red grapes are pressed, and the must is allowed to ferment without the skins, white wine is obtained. This is proof that the color is ordinarily seated in the skins.

The coloring matter is formed in the berries only when they are perfectly ripe. This explains why tart wines, which date from vintages when the grapes had not attained perfect maturity, have so little color. Overripeness has the disadvantage that it makes the skins rot, and thus diminishes the color.

The mode of fermentation also influences, more or less, the depth of the color. Thus, the wines which have been fermented in a manner such that the cap is always kept submerged by grated frames, show more color than wines which have been fermented after the ordinary fashion, in open tanks. This is explained by the fact that the cap, which consists mostly of skins, remains when grated frames are used the whole time submerged in the must, while otherwise it floats on the top.

It follows that the deficiency in color is due: (1) To the incomplete ripeness of the grapes, or overripeness, which causes rotting of the skins. (2) To the small proportion of skins compared with the pulp

and the water of vegetation (watery berries with large seeds). (3) To the fact that the skins are not sufficiently immersed in the must during fermentation.

Wines which are too poor in color may be improved in this respect by the following means: (1) By picking the grapes, if possible, only when perfectly ripe. (2) By planting varieties with small berries, so as to have a greater proportion of skins. (3) By the use of grated frames and foulage. The treatment of wines which are deficient in color should consist, besides the ordinary precautions, in avoiding everything that facilitates the precipitation of coloring matter. For this reason they should be fined as little as possible. Gelatine should not be employed at all for this purpose, but albumen in the proportions as we have given for wines whose alcohol-percentage is low.

It is quite natural that blending wines which are very rich in color with wines which are deficient in this respect, increases the color of the latter; but in order not to alter the natural flavor, the blending should be done with wines of the same character and from the same locality.

The use of vegetable matters, or of fruit juices, for the purpose of imparting color to the wine, should be rejected; some of these substances are, besides, *unwholesome*. In the chapter on *Sophistications* we shall give a detailed account of these substances and the means of recognizing them.

DULL, LEADY, BLUISH COLOR—TASTE OF LEES.

Some wines remain turbid and retain a dull, leady color, even when the after-fermentation is over. There are several causes for such behavior, and it is necessary to look for them and to study them before deciding upon any treatment. Sometimes, even often, the new wines remain turbid because they have undergone an after-fermentation which has disturbed the lees, which had already settled. Such an after-fermentation is due, as we have already explained, to untimely racking, or to the imperfect arrangements of the cellar. New wines also remain turbid if they have been moved without having been previously racked.

In this case the wine should be placed in a cellar whose temperature is constant, and allowed to rest a fortnight. When this time has passed, it should be ascertained if the lees have settled. If the wine has still a dull color, it should be fined by using the methods best suited to its nature.

If the wine is turbid owing to an untimely fermentation, the first thing to be done is to stop this fermentation by means such as are generally applied under such circumstances. If, notwithstanding all precautions, such a wine remains dull, even if all fermentation has stopped, the reason of this defect must be ascribed to the lack of alcohol or of tannin. It is known, indeed, that the coloring matter of wines which are deprived of alcohol or tannin, either settles to the bottom or remains in suspension.

If it is found that alcohol is lacking, the treatment consists in fortifying the wine with one or two quarts of alcohol (70 to 90 degrees) per barrel, or with one fifth or one tenth part of the whole of strong, full-bodied wine of the same flavor, and afterward in fining with the white of a few eggs.

If the wines which remain dull possess a sufficient alcoholic strength, and a satisfactory color to each barrel, an alcoholic solution of about

300 grains of tannin should be added; afterward the wine should be treated with an ounce or two of gelatine. A bluish violet color and a taste of lees is only rarely met with among the wines of the Gironde. This defect is rather met with among certain southern wines, and is due to an excess of coloring matter and to the absence of tartaric acid in the wine. If such wines have much color and more than 9 per cent of alcohol, it is easy to change this color into red by blending them with one sixth to one fourth of a tart wine, which contains, as it is known, an excess of tartaric acid; after that they are treated with 300 grains of tannin, so as to enable them to preserve their color and to undergo the fining processes. If a tart wine cannot be had, crystallized tartaric acid could be used. This acid is soluble in wines. Before using it on a large scale, the quantity which is needed to turn the wine red should be determined by experimenting on a sample; for it should not be forgotten that this acid makes a wine less wholesome.

If the alcoholic strength of a wine is low, if its color is inadequate and blue and dull, it will possess a great tendency to undergo putrid fermentation. In such a case the blue color is indeed nothing but the beginning of decomposition. It is due to a chemical reaction which transforms a part of the potassium tartrate into carbonate of potash. These wines possess a slightly alkaline taste, and if they are left to themselves they spoil rapidly if the air has access to them, but they do not acidify completely. This is the worst kind of a wine. It is possible, however, to prevent this kind of decomposition, which is very rare, even among common wines, by using good processes of vinification, and by making the wine more full-bodied and stronger by the choice of good varieties.

As to the treatment of these wines, several experts have proposed the use of tartaric acid for their improvement. This acid will indeed change their color into red, but it will not prevent the putrid decomposition which threatens them. We prefer to use for this purpose about one sixth part of tart wine, which contains, as we know, a good deal of free tartaric acid, and to fortify afterwards by blending these wines, in convenient proportions, with wines which are full-bodied and possess a high alcoholic strength.

PUTRID DECOMPOSITION—CAUSES OF THE SAME.

Wines undergo a putrid decomposition owing to a great lack of alcohol and tannin. This defect is due to the deficiency in sugar and to the watery nature of the grapes. It is therefore possible to recognize when wine is predisposed to putrid fermentation by its showing a lack of alcohol and of tannin. These wines soon lose their color, and fail to become bright and clear; they remain turbid after the settling of the lees, which, besides, is never complete, and is going on all the time.

The tendency to decomposition is announced by a change in the color they assume—a brick-red, dull hue. Thus wines, though they may be quite young, acquire the appearance of old turbid wines; their red color becomes in the greatest part precipitated, and they retain only a yellowish color. If, in such a stage, they are not immediately fortified, they assume a nauseous, rotten taste, become more and more turbid, and decompose without going through the acetous fermentation.

How to Prevent Decomposition.—The tendency toward putrid decomposition (a rare defect, by the way) can be prevented by using all the

necessary means to increase the sugar in the must in a natural way, and thus by a proper choice of varieties raising the percentage of alcohol.

Treatment of Wines which are Predisposed to Putrid Fermentation.—Putrid fermentation can be delayed by the use of the following means:

1. By raising the percentage of the alcohol of the wine by adding tannin, and by blending with a suitable quantity of wine which is full-bodied, has a high alcoholic strength, and is harsh.
2. Should there be no such wine at hand, brandy or alcohol can be used for the same purpose; or, still better, a solution of tannin in alcohol (of which we will give the composition in speaking of the component parts of the wine), thus raising their alcohol-percentage to about ten.
3. By avoiding as much as possible the use of artificial finings, particularly of such substances as precipitate the coloring matter; for instance, gelatine; albumen should be used instead.
4. Do not permit such wines to undergo shaking and motion of long voyages. Avoid the use of sucking pumps, for strong motion accelerates the precipitation of coloring matters. These various precautions may delay the putrid decomposition, but they do not stop it, and these wines can never bear a long voyage unless strongly fortified before shipment.

Wines which Possess Several Defects.—It happens frequently that certain common wines have several defects at a time. In such a case the defect should be treated which is the most prominent.

FAULTS OR DISEASES OF WINES CONTRACTED AFTER FERMENTATION—FLATTISH, MOLDY WINES.

Nature and Origin of Moldiness.—The moldiness of wine is nothing else but a crust of microscopical fungi which the botanists call *Mycoderma vini* and *Mycoderma aceti*, and which develop on the surface of wines which are in contact with the air. These growths communicate to the wine a disagreeable odor and taste, as well as light acidity, which is known under the names of *flatness, flattish odor or taste.*

The principal reasons for the growth of these parasites is the direct contact of the wine with the air, which favors their growth; further, the evaporation of a portion of the alcohol on the surface of the wine which is in contact with the air, and the incipient oxidation of the alcohol which remains in the liquid.

The result of all this is, that the surface of the wine becomes very low in alcohol, and having thus lost its preserving principle, it becomes moldy. Moldiness consists, as is commonly known, in the development of a large number of small fungi. This mold has a bad taste, and is impregnated with an acidity which is due to the action of the oxygen of the air on the alcohol, it being thereby transformed into acetic acid.

These changes are more or less rapidly effected according to the alcoholic percentage of the wine and to the temperature of the storage cellar. The weak and ordinary wines which contain from 7 to 8½ per cent of alcohol are first attacked. They begin to mold three or four days after having been exposed to the air. Stronger wines which contain 10 to 11 per cent can resist the mold twice as long as the weak wines. Lastly,

the wines which have more than 15 per cent of alcohol do not mold. During summer the changes are much more rapid.

HOW TO PREVENT THE FLATTISH TASTE.—The flattish taste can be prevented by protecting the wines from contact with the air. To do that they should be kept in casks which are always full or in hermetically sealed and horizontally placed bottles. (Compare *General Treatment of Wines.*)

If we cannot avoid having the casks partly filled, the air which remains in the cask should be neutralized by burning a piece of sulphur wick and by afterwards bunging hermetically. (Compare *Sulphurous Acid, its Uses, etc.*)

TREATMENT OF FLATTISH WINES.—Sometimes it happens that new wines have been neglected by not filling up the casks in which they were stored for eight days or more, and it is only the surface of the wine which has become so altered. By filling up the cask, it is possible in such a case to withdraw the mold which has been already formed, through the bunghole; afterwards, the cask should be bunged hermetically, and, lastly, care should be taken to fill up frequently, because a new formation of mold would not only impart a flattish taste to the wine, but would also make it turbid and introduce acid ferments, causing it to sour in the end. (Compare *Treatment of New Wines.*)

A barrel containing wine that is considerably moldy, and which has acquired a distinct, flattish taste, without, however, being rankly acid, should be filled up with fresh wine. The mold is allowed to escape through the bunghole, and then the wine is racked off into a barrel which has been sufficiently sulphured. This barrel should be completely filled. After the racking, one or two quarts of old brandy per barrel should be added to the flattish wine, or the same amount of a strong wine possessing the same flavor as the one to which it is added. Afterwards, the wine should be well fined by using, preferably, egg-albumen (the white of eight eggs and a handful of salt, dissolved in a glass of water), and should be racked again as soon as it has cleared. The object of this treatment is to remove from the wine, by means of racking, the mold which imparts the bad taste; to increase, afterwards, the alcohol, in order to replace that which has been lost by evaporation; lastly, by the use of finings, to precipitate the acid ferments which were produced by the mold. It must be remarked, however, that the wines which have become decidedly flattish can never be cured completely, and if they possessed a fine and delicate flavor, they lose a considerable part of their value. We insist, therefore, that the foreman of the cellar should be careful to prevent this disease, which produces acidity, for often the neglected wines are at the same time *flat* and *sour*.

ACIDITY—PRICKED WINES—ROUGHNESS.

The acidity is due to the fact that the alcohol which is contained in the wine is partly transformed into acetic acid under the influence of the oxygen of the air. (Compare *General Treatment of Wines; Influence of the Contact with the Air.*) All unfortified wines are subject to this change *if they remain exposed and in contact with the air.* If they are fortified so as to contain 18 per cent of alcohol, whether containing sugar

or not, they undergo no change except that the alcohol decreases through evaporation.

Means of Preventing Acidity.—Acidity is prevented by treating the wines according to their character, by storing them in convenient cellars (compare *Treatment of Wines*), and by using the precautions indicated in speaking of the flattish and moldy wines; that is, by avoiding all kinds of prolonged contact with the air. Mold is, as we have just said, the forerunner of acidity. However, the wines do not always become moldy before getting sour, particularly if the temperature is high, and if their alcohol-percentage is a high one. Generally the wines turn sour without becoming moldy if they are exposed to the air at a temperature of 77 degrees to 104 degrees; under these conditions acidity is produced very rapidly; this is the reason why the precautions should be doubled during hot weather, and why it should be remembered that this fault is due either to the negligence of the foreman in permitting the access of air, or to the casks being in poor condition and the imperfect construction of the cellar.

Treatment of Pricked Wines.—The acetic acid which is contained in pricked wines can be neutralized to a great extent by the reaction of several alkaline matters, but in this case there remain dissolved in the wine salts (acetates and tartrates) which are formed by the combination of acetic and tartaric acids, with a part of the alkaline substances which were introduced.

The alkaline matters neutralize by this combination, not only the acetic acid but all the organic acids which are contained in the wine. These neutral salts are not perfectly wholesome; they are to some extent purgatives. Aside from that, it is not possible to neutralize completely the acetic acid which is contained in the wines by using caustic alkalies (potash, soda, quicklime), for by their introduction they decompose the wine, they effect the precipitation of the coloring matters, and impart besides an unpalatable, bitter taste. It is therefore necessary to select for the treatment of pricked wines alkaline substances which are best fit to neutralize the excess of acetic acid without changing the composition of the wine, without altering the color, and which produce by their combinations with the acids the least soluble and the least unwholesome salts.

The alkaline substances which should be chiefly used are: Carbonate of magnesia, tartrate of potash, and lime water.

The following substances should be used only in cases when it is impossible to obtain those just mentioned: Wood ashes (preferably the ashes of grapevines, which contain a great deal of potash); chalk, or pulverized marble; solution of bicarbonate of soda, and of bicarbonate of potash.

How to Apply These Substances.—It is advisable to try first on a small sample, say one quart, of the pricked wine the effect of the substances which it is intended to apply. Care should also be taken to use quantities which are proportional to the degree of alteration of the wine. Thus, to one quart of pricked wine there should be added in small portions, shaking the bottle all the time, 15 or 30 grains of magnesium carbonate. In case the wine is considerably pricked, the quicklime

should be slaked in water in convenient quantity; the mixture should be shaken and then allowed to subside until the supernatant water becomes clear; 1.2 cubic inches of this lime water should be added to the wine which has already been treated with magnesium carbonate; after that 0.6 cubic inches of brandy are added, and lastly an albuminous fining, preferably fresh milk, in a dose of 0.6 to 1.2 cubic inches, is added; the bottle is then corked, shaken, and allowed to rest. At the end of three or four days it will be possible to judge the improvement which has been produced by the treatment, by comparing the pricked wine with the treated sample.

This treatment varies according to the kind of wine in which the acid taste is found. If the wine is not only pricked, but also tart, fifteen grains of tartrate of potash, besides magnesia, should be added; if the wine has a dull color after the milk has been added, a small quantity of gelatine solution is also used; lastly, if the wines are turbid and difficult to clarify, there should be added before pouring in the milk and the gelatine solution a small quantity of tannin.

It is hardly necessary to mention that the quantity of each substance to be used should be adequate to the condition of the sample, and that the same proportions should be used on a large scale.

If carbonate of magnesia cannot be obtained, the quantity of lime water should be doubled; and lastly, in case lime is not at hand, marble or powdered chalk could be used, but very cautiously; also the ashes of the shoots of vines, but in smaller quantity, or solutions of bicarbonate of soda or potash. The last mentioned substances require much precaution in their use. We should avoid employing them in cases where the wine is only slightly pricked. As far as my own work is concerned, I prefer the carbonate of magnesia to all other alkalies, because it does not act so strongly on the color and does not impart to the wine the bitterness and unwholesome properties which potash, lime, and soda salts do. (It is a well known fact that the carbonate of magnesia is used in medicine as an antidote for the acidity of the stomach.)

To these wines brandy is added in order to replace the alcohol which was destroyed by the formation of the acid. As far as the fining is concerned, the preference given to the milk in this case is due to the fact that milk has an alkaline reaction. It helps, therefore, to neutralize the acid taste of the wine, and clarifies it at the same time; but milk is alkaline only when it is fresh; the skimmed milk of the day before is acid—it should not be used. Lastly, the tartrate of potash and carbonate of potash are used in the treatment of pricked or tart wines. Gelatine and tannin neutralize the tartaric acid, and facilitate the clarification and precipitation of acid ferments.

Wines whose acid has been neutralized should be fined and racked as soon as they have completely cleared. This result can be obtained by following the method above indicated. The more acid the wines are, the less alcohol they contain, because the acid has been formed at the expense of the latter; therefore, it becomes necessary to fortify them, either by adding alcohol, or, if the change is not a deep one, to blend them with strong, but ordinary wines. Should this change, on the contrary, be very great, and consequently their alcohol-percentage very low, it will be more profitable to convert them into vinegar.

TASTE OF THE CASK.

The taste of the cask should not be confounded with the taste of the wood, as this taste, when imparted to the wine, is due to the aromatic substances contained in the oak. The wines acquire it generally in new casks. The taste of the cask is a bad one, due to a disagreeable essence of taste and smell, produced by a peculiar change in the wood of one or of several staves, or of the bottom of the casks. This defect is very rare. It is impossible for the cooper to prevent it, and reject the staves which impart the bad taste, because there is no sign by which they may be recognized.

The treatment of wines which have contracted a bad taste of the cask consists in transferring the same as soon as possible into good and sulphured barrels, in order to remove them from the contact with the wood which has imparted to them the bad taste. This bad taste may be diminished by agitating the wine for five minutes or more with a quart of olive oil. This should be afterwards taken out by means of a pipette. After that, a good dose of fining—white of eggs, or gelatine—should be applied suitable to the wine. Following this, after a week or fortnight, the wine should be racked. The object of this treatment is to secure, by means of a non-volatile oil, the volatile essential oil which seems to be the reason of the bad taste. And, indeed, the olive oil which is used for this purpose, acquires a decided taste of the cask. It is possible, by treating the wine in this manner, to attenuate the taste of the cask; but it is seldom that it can be completely eradicated.

MOLDY TASTE—BAD TASTE PRODUCED BY FOREIGN MATTERS, ETC.

The wine acquires a moldy taste by remaining in casks whose staves are moldy on the inside. The presence of mold is due to carelessness and negligence, which, in this case, consists in leaving casks empty without sulphuring and bunging them hermetically. (Compare the article on *Empty Casks.*) The mold of the empty cask is a whitish moss, which consists of microscopical fungi; it develops under the influence of humidity and darkness; its disagreeable taste seems to be due to the presence of a certain essential oil.

This defect is prevented by carefully inspecting the casks before filling them, and by avoiding the use of those whose odor indicates moldiness.

Wines which have accidentally acquired a foreign taste, either by having been kept in casks which had originally held "liqueurs" with a very decided taste and flavor, such as anisette, absinthe, rum, etc., or by their contact with odoriferous substances, owe this taste to the solution in the wine of a portion of the essential oil which is contained in these substances, and should be treated in the same manner as the wines which have acquired the taste of the cask. First of all, they should be removed from the infection as soon as possible by drawing them off in other casks.

Slime.—Under this head a property and alteration are indicated: a property, if the mellow, oily, and fruity taste of certain wines is understood; an alteration, if a certain fermentation is meant which makes the wines ropy, like oil. This alteration, which is really nothing but a certain kind of fermentation, is peculiar to white wines, which hold in suspension nitrogenous matters which contain only a small quantity of

tannin. This is not a serious defect and is easy to remedy. It is sufficient to add to a barrel of such a wine several gallons of wine in which tannin has been dissolved or a solution of about three hundred grains of tannin in alcohol. The whole should be well mixed and shaken as in the case of the application of ordinary finings. (Compare *Tannin.*)

The tannin which is mixed with the wine precipitates the slimy matter by combining with it. Thus a real fining is effected by the chemical action of the tannin. These wines should be racked a fortnight after the treatment with tannin.

BITTERNESS.—Bitterness, which is often a natural defect (we have already spoken of it), becomes an accidental defect if it develops in old wines which before had a frank taste. In this case it is almost always the beginning of decomposition. This bitter taste is chiefly due to the compounds which are formed by the decomposition of color, and by the precipitation of mucilaginous matters which give to the wine the mellow, fruity taste; and, indeed, it has been noticed that the wines acquire bitterness in the same proportion as they lose their fruity taste. It is possible to diminish this bitterness by fortifying. We may regenerate the bitter wines only by blending them with wines of the same character, young and strong ones which have not reached their full maturity. The blend should be fined with albumen and racked after a fortnight. Thus these wines can be improved; but at the end of several months the bitterness reappears. These wines should be, therefore, consumed as soon as possible.

ROUGHNESS.—The rough taste which certain wines acquire in aging is a sign of decomposition. We have some reason to believe that this defect is due to the presence of acetic acid and to the precipitation of the mucilaginous substance which gives to the wine the mellow taste; indeed, this defect is most frequently observed in the case of old wines.

The proper treatment to diminish the roughness consists in destroying the acetic acid, by using sixty to one hundred and twenty grains of magnesium carbonate per gallon (compare *Pricked Wines*); or, if the roughness is not very prominent, to blend such wines with young and strong ones which have a frank taste; after blending, the wine should be fined, in order to make the mixture more complete. As fining the white of egg should be used with preference.

TASTE OF "WORKING" OF THE LEES, ETC.—The taste of "working" is due to the presence of carbonic acid gas, which is given off from the wines as soon as they undergo an after-fermentation, either owing to the sugar which they still contain, or to mucilaginous substances. The principal reasons for the "working" are the presence of sugar and of mucilaginous substances, together with the ferments. Under the influence of a higher temperature, the "working" begins. The taste of lees is due to the rising of the lees and of the sediments. The taste of "working" wine and that of the lees can be prevented by conducting the vinification under favorable conditions; by keeping the wines at a constant temperature, and by separating them from the lees by timely racking.

The "working" can be stopped by racking the wine in other barrels, which have been previously sulphured. During the racking the wine should not be allowed to come in contact with the air. After racking,

the barrels should be placed in a cellar whose temperature is low and constant. Should it happen that the wine be turbid, it should be fined with the substances which suit its character best; the wine should remain in contact with the fining only during the time which is strictly necessary to effect its clarification. The details of these operations have been mentioned in the paragraphs on sulphurous acid, finings, and special treatment of each kind of wine.

Degeneration—Putrid Fermentation of Wines.—The degeneration announces itself in the wine by many signs a long time before it really sets in. These signs are loss of the fruity taste, bitterness, roughness, etc., but the true symptoms of degeneration in old wines are the more abundant precipitation of their blue coloring matter, their turbid condition, and their slightly putrid taste. The chief causes of this alteration are the same as those which we have mentioned in opening, of the tendency of the new wines to putrid decomposition; namely, a low alcohol-percentage, together with a lack of tannin. It is known that with time the tannin is transformed into gallic acid, also the alcohol decreases through slow evaporation, and thus it happens that wines which are too old have lost a portion of their preserving elements—alcohol and tannin.

How long wines may keep is very difficult to say; like animated beings, they show a great diversity in their character. Very weak wines begin to decompose the first year, while others, which are stronger, improve during four, six, ten years, and perhaps longer. As soon as it is apparent by the aspect and by the taste of a wine that it has begun to degenerate, it is important to stop, as soon as possible, the beginning of the decomposition. This can be effected by the use of a solution of tannin in alcohol (compare *Tendency Towards Putrid Decomposition* in the paragraph on *Natural Defects*); but it is more advisable to blend such wines with young, strong wines of the same character. (Compare *Diseases of Bottled Wines.*)

CHAPTER VI.

THE LEES OF WINE.

Composition of lees. Wines extracted from the lees. Methods of extraction. How to avoid the bad taste and to press the lees economically. Presses. Use of the dry lees. Pearlashes. Crude tartar.

The lees should not be neglected, for, in the absence of timely precautions, the wines which are extracted from them acquire a bad taste, due to the fact that they have remained too long a time in contact with the sediments.

To prevent this alteration, which would deprive the liquid of all its value, the lees should be treated with very particular attention, and should be kept in cellars which are perfectly protected from changes of temperature.

Before being separated the lees contain from 30 to 90 per cent of wine. The lees of wines on which finings have been used contain about 70 per cent of wine, not comprising that which can be extracted by pressure.

The dry portion of the lees contains a large quantity of insoluble matters, of tartar, several other organic and inorganic salts, various com-

pounds, ferments, mucilage, residues of animal or vegetable matters, albuminous or gelatinous, which have been used as finings.

M. Bracounot, a distinguished chemist, who has analyzed the dried lees, has proved in them the presence of the following substances: bitartrate of potash, tartrate of lime, tartrate of magnesia, phosphate of lime, sulphate and phosphate of potash, organic nitrogenous matter, fatty matter, coloring matter, gum, tannin.

This composition of the dry lees varies according to their age and the nature and variety of the wine from which they have been deposited; but in all of them the salt which is met with in great abundance is the bitartrate of potash (tartar). The lees of mellow wines contain mucilaginous substances, and in the lees of sweet wines great quantities of sweet matter are found which can be utilized. We are going to speak later of the various uses of dried lees.

If intelligent care has been exercised, it is not only possible to draw off all the liquid above the lees, but also this wine will have no bad taste.

Practical Treatment of the Lees.—The empty barrels which are destined to hold lees should be washed and rinsed just as if they were destined to contain bright wines. In these barrels a piece of sulphur wick should be burned. In proportion as the racking of the wine is carried on the lees are emptied in a pail and *immediately poured* into the barrel which is destined to hold them. (Care should be taken when the lees are emptied in the pail, not to introduce into the latter earth, mold, etc. If the circumference of the bunghole is dirty, it should be brushed before taking out the bung.) As soon as the barrel is filled with lees, it should be placed like wine with the bunghole upward, in a close cellar.

If the barrels cannot be filled completely the same day, they should be bunged hermetically after having burned in them a new piece of sulphur wick. This operation of sulphuring should be repeated every time that new lees are poured into the barrel, the barrel having remained several days only partly full. This constant sulphuring is not only to prevent the access of the air which would acidify the wine, but also to prevent a renewed fermentation which could be possibly started by the ferments contained in the lees. In a word, the barrels which contain lees, without being quite full, should always be well bunged, sulphured, and protected from variations of temperature.

After the barrels with the lees have been placed in a cellar which has an even temperature, they should be filled up regularly every week with clear wines; after fifteen days of rest the clear liquid should be drawn off for the first time; this operation should be repeated every month; thus, by simple racking, the whole clear portion of the liquid can be drawn off, if using the precautions which we are going to describe later. By following this method any after-fermentation is avoided, to which the lees are very subject, particularly in summer; also, the disagreeable taste of lees is avoided, and harshness and bitterness, which the wines that have remained a long time in contact with the sediments may acquire.

Faulty wines, whatever their defect may be, also those which have been recovered from breakage, from leaks which have sprung up unexpectedly in the casks, or those which have been collected from the floor,

should never be poured in with the good lees, for they would spoil them. Wines belonging to this class should be poured into separate barrels and treated each according to the fault which it has.

Separation of the Lees from the Wine by means of Glass Siphons, etc.—The lees which have not been separated from the wine, and which are kept under the conditions we have described above, on standing, get rid of a large portion of the foreign substances which they contain, for these are insoluble and specifically heavier than the wine.

The separation of the wine from the lees can be effected in two ways—either with the help of a glass siphon, or of a stopcock. For the first separations transparent siphons made of glass are preferred. The siphon is introduced through the bunghole into the barrel to a depth of about eight inches; two empty well rinsed and well drained pails are placed under the longer leg; then the liquid is sucked in, holding the siphon up so that it should not sink too deep into the barrel; with the help of a candle which is placed above the siphon, it is possible to ascertain if the wine which runs out is almost clear; as long as it remains clear the siphon is gradually immersed until the level of the turbid wine is reached. As soon as the first pail is full the second must be placed under the leg of the siphon, without stopping the outflow of the liquid. In order to apply this method, the presence of two men is necessary (unless one has great experience), of whom one watches and holds the siphon, and the other pours the clear wine into a rinsed and sulphured barrel. As soon as the liquid begins to show turbidity the outflow is stopped, and the same operation is performed with other barrels.

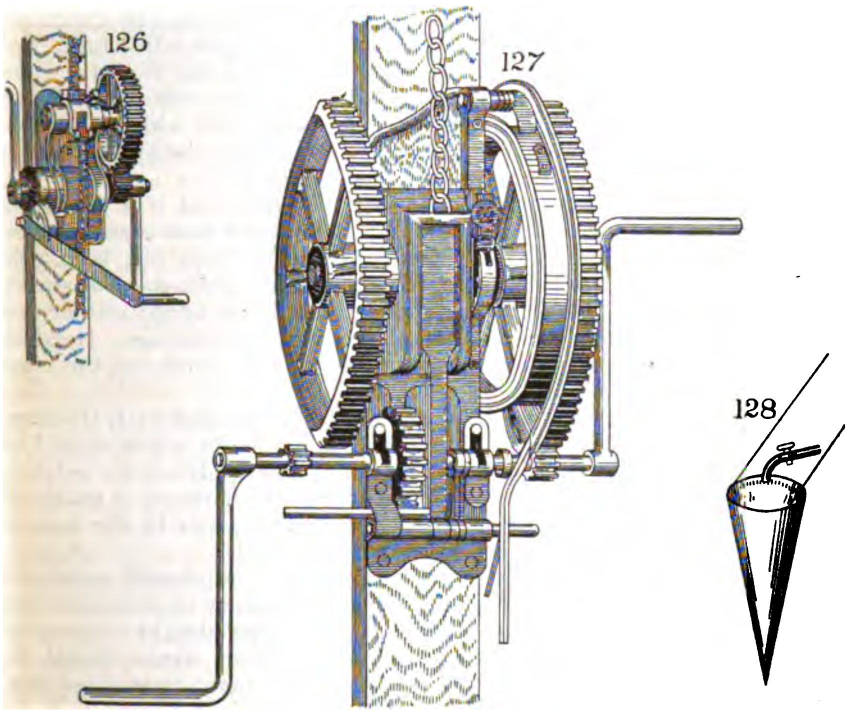
When the lees and wine in all the barrels are separated, the lees are collected in a barrel which already contains the greatest quantity of them. Before filling the barrel it is important to burn in the same a double square of sulphur wick, in order to prevent an after-fermentation. In order to collect the lees in an easy manner, they are emptied into great pails, if there are not more than ten gallons in each barrel; but if there is a greater quantity of them, the barrels are raised on other barrels, and the lees emptied by means of a stopcock, if they are not too thick; otherwise through the bunghole. In this latter case, the bunghole should be cleaned from time to time with a small stick, to facilitate the outflow.

The use of a stopcock is preferable to that of a siphon if the lees are thick and if the barrels which hold them are placed on the floor. By separating the lees from the wine with a stopcock, it is possible, at least for the first separation, to avoid the piercing of several holes in the bottoms of the barrels. It is the deterioration of the bottoms produced by these holes which often makes the siphon preferable to the stopcock. By piercing the end or head, the bottom is not spoiled, and besides the advantage is there that it is possible to extract with the stopcock a greater quantity of wine than with the siphon; but this wine is generally less bright than that which is drawn off cautiously with the help of a siphon. This system allows one man to perform all the necessary operations without further help.

Before beginning the separation of the lees and wine with the stopcock, it should be ascertained by means of some gimlet holes, or of a long glass tube, where the clear wine begins; then a hole for the stopcock is bored just above the surface of the lees. If, as we have already

said above, the barrels have not yet been used for the lees, and if the latter are separated for the first time from the wine, the hole for the stopcock may be bored instead in the middle piece of the head on the same level in one of the side pieces a little farther than one inch from the cross groove. Thus the bottoms are not spoiled.

The wine which has been drawn off from the lees should be immediately poured into rinsed and sulphured barrels, and should not be allowed to stand exposed to the air.



HOISTING MACHINES.

126. Windlass, system A. Suc. This windlass should be fixed on a post or pivot.
127. Windlass, system A. Suc. Double speed, for hoisting heavy packages. It must also be fixed on posts. This windlass is provided with a brake for the purpose of letting down freight, and a ratchet for holding the lifted weight when necessary.
128. Conic filter, made from woolen cloth or felt. This filter is fixed to a hoop of iron, which can be suspended wherever necessary.

The lees should be collected in the same way as we have already described. Care should be exercised in collecting the lees from which the wine has been already extracted several times, and which have yielded a small quantity of wine, not to fill the barrels with them except after thorough sulphuring. Then we must not move these barrels, because the movement would disturb the sediments and would impart a bad taste to the wine which is still on the lees, and even give rise to putrid fermentation, particularly if the lees contain large quantities of albumen and gelatine which were used as finings. It is hardly necessary to add that the barrels used for lees should, as soon as they have been

emptied, be thoroughly rinsed, drained, and sulphured; otherwise the lees would adhere to the staves, where they would dry.

Classification of the Wines Extracted from Lees.—The wines which have been extracted from the lees are often wanting in clearness; it is generally more difficult to clarify them completely by using the ordinary methods than the wines of the same character from which they originate; it has also been observed that these wines have considerably less color and show a lower percentage of alcohol than ordinary wines of the same origin.

The difficulty met with in obtaining their complete clarification consists in the presence of large quantities of insoluble matters which are held in suspension, and in the relative weakness of these wines in alcohol and tannin. The decrease of the color is due to the mechanical action of the insoluble matters contained in the lees. These matters settle and carry down with them a portion of the coloring matter which is in solution. It follows, therefore, that the older the lees are the less intense is the color of the wines which are extracted from them.

If the wine extracted from the lees is a red wine, and if it is desired to clarify the same completely, it should be treated with a strong dose of albumen (the white of ten eggs per barrel), which has been well beaten in half a pint of salt water. If the alcohol-percentage of such a wine was below nine, to each barrel there should be added one or two quarts of brandy, or of alcohol, before applying the finings. Gelatine should never be used for fining red wines of this kind, as the color would suffer too much.

The white wines extracted from the lees can be treated with albumen, if their alcohol-percentage is high. The weak white wines should be treated with a strong dose of gelatine; but before applying the gelatine it is necessary to add some tannin, either in the form of a couple of gallons of wine which has been treated with tannin, or in the form of three hundred grains of tannin dissolved in alcohol.

The wines which have been extracted from the lees should remain in contact with the finings so long as is strictly necessary to precipitate the finings used (about ten days). After this time they should be carefully racked. When reaching perfect brightness these wines should be treated, according to their character, in the same manner as those from which they have been extracted.

PRESSING THE LEES.—After having drawn the wine from the lees three or four times, it is possible by pressing to recover a still further quantity, as the lees contain, on the average, not less than 50 per cent of liquid.

Economical Arrangement of a Press for the Lees.—The pressing of the lees is done in small sacks, which are approximately one and one half feet long. The material of these sacks should be *cotton cloth*, because the sacks which are made from hemp impart to the wine (even if they have been used several times) a disagreeable taste; this sack taste is very injurious to the quality of the wine. Cotton, which does not impart any bad taste, should always be chosen.

The lees from one vineyard, or from one cellar, can be pressed without any other expenses than the purchase of a sufficient number of sacks. The cloth should be fine, and have regular and tight meshes.

In order to arrange a cheap press for the lees, an empty barrel is taken, and its bottom staved in; this bottom is now fastened together by two crossbeams; when this is done, a little less than half an inch of wood is

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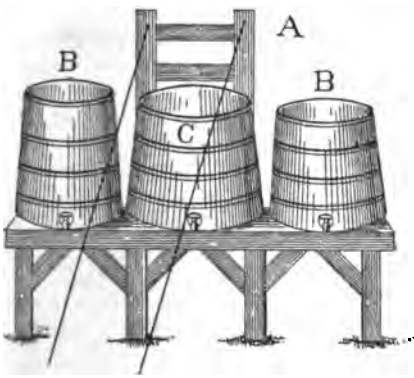

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129. Press tanks and frames for lees. For description of its working see text. *A*, fulcrum for the lever; when it cannot be fastened to the wall, bars are placed in front or behind *B B*, for a similar purpose; the lever may then be used by the aid of blocks of wood in proportion as the contents of the sacks are compressed. When the apparatus is permanently established, a pulley is placed above the weight on the end of the lever, in order to hoist it when necessary; it is then sufficient to place new blocks of wood under the lever in order to reëstablish the pressure.

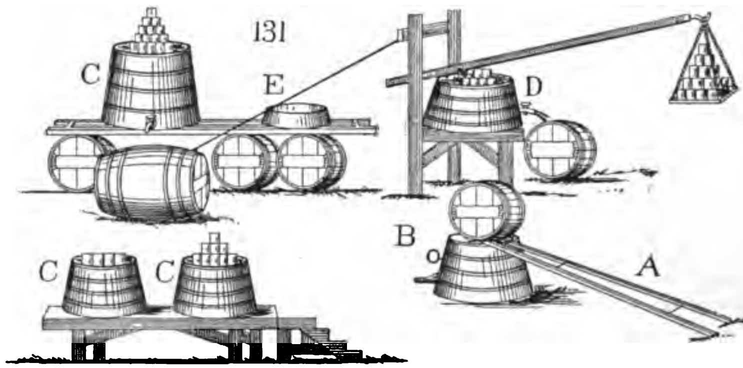
130. Closed wine filter. Closed filter lined with copper on the inside. This kind of filter has one, three, or five sacks, according to the diameter. These sacks are made of wool and sometimes of special tissues, according to the liquid to be filtered. They can be filled without the liquid coming in contact with the air, by means of an india-rubber tube with a stopcock at its end; this stopcock is attached to the filling-cock. A glass gauge is attached to the outside to indicate the contents.

taken off from the periphery of the bottom, so that it will easily go into the barrel, and thus answer for a cover. Afterwards, in one of the staves of the barrel, a gimlet hole is bored about half an inch above the bottom which remains, in a manner that this hole just touches the bottom in the interior of the barrel. Lastly, a stopcock is introduced into the gimlet hole. This barrel, which is destined to hold the sacks, is now placed alongside a wall on two barrels, which are covered with a board; if necessary, the barrel is raised to a sufficient height so that below the stopcock an empty barrel, destined to receive the pressed wine, can be placed.

In order to empty the lees into the sacks rapidly and easily, the full barrels are raised on a scaffolding, and emptied into the sacks. During this operation the sacks are held open by means of a piece of twisted wood; as soon as a sack is full, it is solidly tied up with a knot easy to undo again. In this way one sack after another is filled into the barrel until full.

During all this time the stopcock remains open, and the wine runs off in proportion as it is filtered into the empty barrel, which has been previously rinsed and sulphured.

When the barrel is filled with the sacks the cover is placed on top of them, and very gradually charged with weights; afterwards, the pressure is continued with a lever. The pressing of the lees should be carried on very gradually; thus, the lever should be used only after the sacks have been drained during several hours without the application of pressure; the lever should be also charged with weights after several hours; better still on the following day.



131. Filter presses; *a*, a bridge used for emptying the first lees in the tub *b*; in *c* is a utensil hooked to the pail—a kind of tin basin with double bottom of rectangular form—which possesses one or several iron rings which have the diameters of the sacks; *c*, *c*, *c*, these are small vats, which have an inner diameter of three and one third feet, and are about two to two and one half feet high; the first one contains about ninety gallons, and those which are two and one half feet high contain about one hundred and forty gallons; *d*, press for the lees with long lever; *e*, pail which is used for putting in the sacks, or to press them.

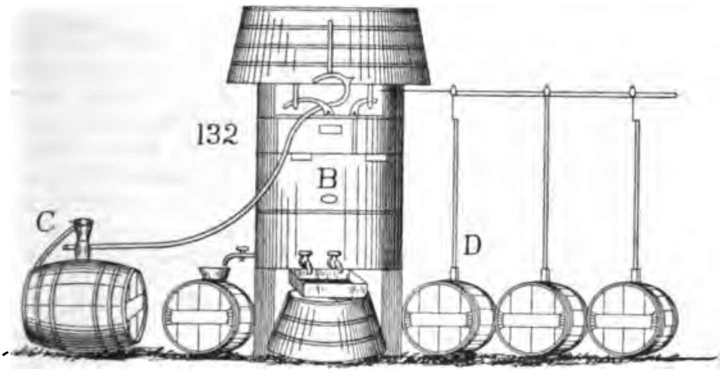
When there is no more liquid in the bags, which may be recognized when, notwithstanding the use of the lever, no more wine drops from the stopcock, the sacks are taken out of the barrel.

When the lees are not very compact there remains little masses of solid substance in the bottom of the sacks; in this case they may be filled again without taking out the solid residue and pressed a second time. After that they should be thoroughly rinsed. Lye should be never used for this latter purpose.

This simple arrangement, which does not imply any other outlay than the purchase of sacks, is sufficient for the small wine maker who wants to utilize the lees of his wines without incurring unnecessary expenses.

Filters.—It has been tried to filter the lees by using strainers of various patterns; some manufacturers of filters announce, in advertisements, that they extract by means of these filters *all the clear wine which is contained in the lees.* This is nonsense. All practical men know by experience that if a liquid is filtered which contains too much sediment, the filters are the more dirtied, and the more turbid and thick the liquid is; it follows that if the filters can be used to clarify the lees of old wines, these lees are practically nothing but *turbid wines.* But the real thick lees—lees from new wines and from those which have been treated with finings—are much more economically treated by the processes we have described above; if an attempt is made to filter such lees there remains on the strainers a kind of mud which contains still, on the average, 40 per cent of wine, which it would have been possible to extract by applying pressure.

Dry Lees.—The dry lees possess some value; they can be sold to the manufacturers of tartar, if they are made from the first lees; otherwise, they can be dried completely in the sun and sold to the manufacturers of pearlashes. But as the quality of these lees is rarely sufficiently



132. Automatic filter arrangement. The liquid is poured into the closed vat above, either by a stopcock above or from below, with the help of the forcing apparatus *c*; a gauge indicates the height of the liquid in the vat; regulating stopcocks slacken or stop the outflow of the liquid, according to the yield of the filters, which are located in *c*. The clear liquid flows out at *d*, and bungs of a special design distribute the liquid equally between several barrels which are placed on the same level; the liquid which runs off at the beginning of the filtration escapes through the stopcocks in front; if necessary, it is again forced into the apparatus by means of the airpump *c*.

high for this purpose, their sale would not cover the expenses of shipping, unless the manufactories are very near.

Pearlashes are nothing else but the ashes resulting from the combustion of the dry lees, which is effected in specially constructed furnaces. The lees of higher quality which have been dried completely, yield approximately one thirtieth of their weight of this alkali, which has a gray-greenish color. In case of necessity it is possible to manufacture pearlashes on a small scale without any special furnaces, simply with the help of a stove possessing a very large firegrate. In this case it is important to modify the stove in a manner such that the combustion of the dry lees, which is effected with difficulty under the ordinary circumstances, can be carried on with ease. This can be done by regulating the air supply, and by stimulating combustion through the addition of highly inflammable substances. If there is no market in the neighborhood for the ashes or for the lees, the latter can be used as a fuel by mixing them with coal. Dried in the sun and afterwards pulverized, the lees make also a powerful fertilizer, which is excellently adapted for meadows and all kinds of crops.

The dry lees which contain gelatinous matters, owing to the use of finings, burn only with difficulty in ordinary furnaces, because the gelatine has the property of becoming liquid as soon as the lees are heated, and thus the fire is extinguished. The lees which contain albumen do not show the same disagreeable quality, for albumen solidifies when heated. Anyhow, dry lees which consist partly of finings are less rich in pearlashes and tartar than the lees from wines which have not been treated with finings.

Pressed lees, and particularly the first lees from the sweet wines, contain considerable quantities of sugar, which is possible to utilize by fermenting and distilling. This operation can be profitably carried on only when their value as crude tartar is equal to zero.

TARTAR.—This substance can be extracted from the first lees after they have been dried. For this purpose the dry lees must be mixed with water. The process of extraction, however, requires manipulations, the details of which do not enter the scope of this work; we will only say that the tartar is much more soluble in boiling water than in cold water; this property is made use of to extract the tartar from the lees and to refine the crude tartar which is contained in the pressed lees, and which thus becomes *cream of tartar;* but the processes of extraction and of refining require a special plant, which costs a good deal of money; therefore, the wine makers generally sell the crude tartar to the refiners, who extract the cream of tartar.

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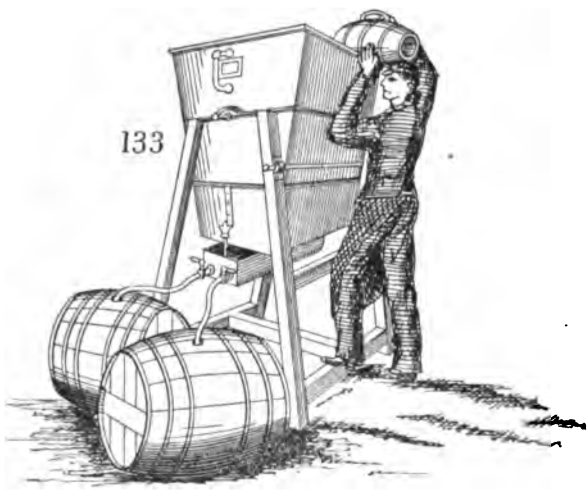

133. Filtering apparatus with frames. System of L. Mesot.

After the lees have been well mixed with water, the mixture is heated until the tartaric acid has been dissolved; often when the lees have remained slightly moist they contain still a small quantity of alcohol, which could be recovered by passing the first vapors which rise from the boiler through a worm, cooled by water. When the tartar is dissolved the liquid is filtered; on cooling, the tartar crystallizes out.

In order to accelerate the work, the water which has already given a crop of tartar is used again to leach out the lees. According to Batileat, who first tried to utilize the salts which are contained in the lees, the tartaric acid of the tartar can be obtained by transforming the latter into tartrate of lime. For this purpose it suffices to saturate with lime the liquids which contain tartar; thus a precipitate of tartrate of lime is formed. To sum up, it is possible to utilize in the following manner, and to extract from the lees according to their nature and consistence, the following substances: (1) clear wine by racking; (2) wine by pressing the lees; (3) alcohol by distilling the lees which have not been pressed; (4) pearlashes; (5) tartar; (6) manure; (7) fuel.

CHAPTER VII.

BLENDING AND THE BOUQUET OF WINES.

General remarks on the blending of wines. Flavor and natural bouquet. Artificial bouquet. Nature and composition of the bouquet.

GENERAL REMARKS ON THE BLENDING OF WINES.

The object of blending is:

1. To impart a uniform flavor to wines which possess the same character, which come from the same locality and sometimes from the same vineyard, but which have been fermented at different times.
2. To improve the wines by mixing those which possess opposite qualities and faults, *i. e.*, to give to a wine a quality which it does not possess, by mixing it with another that has an excess of this quality.
3. To compose good tasting wines from brands, each of which, if tasted separately, show some defect.

Blending which is done solely in view of saving money, without regard to the respective qualities of the wines which enter the blend, is not worth while speaking of. In most instances it will only prove harmful to the keeping qualities of the blend.

It is difficult to define precisely the kind of blending which a wine requires without first having tasted it, and without knowing for what use it is destined. Blending is mainly a practical business, which requires good judgment, and which should not be done haphazard.

BLENDING FINE WINES.—Great wrong is done to a fine wine which shows good promise for the future, and which dates from a good year, by blending it with other wines of a different character, particularly if the wine has not yet reached its maturity, and if its bouquet and flavor are not yet well developed. Experience has proved that such a wine, even if blended with old wines of good quality, never reaches the degree of perfection which it would have attained had it been left alone. It has been found that such a blend loses its fruity taste more rapidly, and is more apt to deposit sediments in the bottles. Nevertheless, it sometimes happens that such blending becomes necessary. This is the case when a wine has been kept too long in the barrel and has deteriorated by losing its fruity taste, thereby becoming harsh and dry. Blending also becomes necessary when the wine comes from an indifferent vintage, and when it is too poor in body or too tart or too weak to keep a long time without deteriorating. If the wine has deteriorated by having been too long in the barrel, it will be necessary to blend it with wines of the same kind, which, if possible, should come from the same vineyard. They should be also at least one to two years, and at most three years old, and should be very mellow. As to the quantity of the wine which has to be used, it should vary according to the degree of the deterioration of the old wine, and the time which it is intended to keep the blend without using it.

When wines which are low in body and in alcohol have to be treated, their keeping quality being doubtful, they should be blended with young and strong wines which are rich in body, and those which, if possible, possess the same flavor.

What we have just said applies only to weak, delicate wines which possess flavor and bouquet, but not a very decided tartness. As far as the weak and tart wines are concerned, wines which promise well should not be sacrificed to fortify such wines, for the excess of tartaric acid which the tart wines contain would entirely destroy the mellowness of the wine used for blending.

Before blending the wines which are too tart with other wines, it is advisable to neutralize their excess of tartaric acid in the manner already described in the chapter on the *Treatment of Faulty Wines*.

In blending wines of a high quality we should observe the following:

1. Do not leave them in prolonged contact with the air during racking.
2. Do not blend them with wines which are yet "working," which taste sweetish, or are somewhat faulty.
3. Do not leave them to themselves if they are not perfectly bright.
4. Avoid using large quantities of finings on wines which are low in alcohol and tannin. After having been blended with stronger wines, these weak wines should be well stirred, in order that the mixture should become a complete one; they should be always clarified with albumen; the whites of not more than five or six eggs should be used.

Blending Ordinary Wines.—We have said already that the object of blending is to improve the wines. We must, therefore, by means of blending, try to impart to ordinary wines the qualities which are prized in wines of high quality. It is known that these latter differ from ordinary wines by the suavity of their bouquet and their flavor—by their mellowness and the fruity taste which they retain when aging. The ordinary wines (we don't speak here of wines which are faulty, but of indifferent brands, which are met with in many wine-growing districts), which contain sufficient alcohol to prevent them from spoiling, but which do not possess either bouquet or any decided flavor, have seldom a fruity taste. It happens sometimes that they are mellow when new, but rapidly lose this quality, and become dry in their second year.

It is therefore desirable to impart to them, by the aid of convenient wines of the same age, bouquet, flavor, and mellowness, or at least to deprive them of their dryness, which process is a difficult one. It is, however, possible to reach the desired aim approximately, by blending such dry wines with wines from the same vineyard which possess a decided bouquet and flavor. All these operations are of a very delicate nature, and it is impossible to give any definite rules, on account of the great variety of wines.

Artificial Bouquets.—Artificial bouquets are made by the addition of aromatic substances of essential oils, from which the aroma is extracted by means of alcohol. The extraction of the aromatic principle can be either by digestion, distillation, or by means of non-volatile oils, which are afterwards dissolved in alcohol, etc. After all, these processes differ according to the peculiar character of the aromatic substances which are employed.

The aromatic substances which are mostly used to impart an artificial bouquet to dry wines are, if we begin with the most common and most powerful ones: iris root, raspberry, vine blossom, clove, reseda, muscat nut, bitter almond, sassafras, etc. The last mentioned substances are rarely employed alone, and play only a secondary part. They are

usually mixed with iris or with raspberry, the aromas of which are quite distinct.

Iris.—There are two varieties of iris. Only the roots are used, which are white, and have a diameter of at least three quarters of an inch. They possess very irregular and distorted forms, and occur in the trade in pieces, about two inches long, which are now freed from the rootlets. They are particularly used in perfumery.

The Florentine iris root, which grows in Italy and the south of France, has a distinct odor of violets. The German iris is often sold under the same name; a variety which grows in the north of France, Germany, etc. The form of the roots is approximately the same, but the connoisseur has no difficulty in distinguishing the German from the Florentine iris; the latter possessing a less glossy and fatty texture, a greater number of rootlets, and particularly a much more penetrating odor.

The aroma of iris can be extracted only with difficulty and incompletely by distillation. It is also obtained by infusing the roots in alcohol, after having reduced them to a pulp by means of a rasp. This operation is very tedious, but indispensable. Iris can also be obtained in commerce in the form of a powder, but when the roots have been powdered long since, they have generally lost a part of their aroma; sometimes, also, the powder of the iris is adulterated with foreign substances.

Tincture of iris is prepared according to the following prescription: Spirits of wine (85 degrees), two and one fifth gallons; Florentine iris, two and one fifth pounds. The vessel containing the mixture should be corked, then shaken for some minutes, and placed in a spot where the temperature is not below 68 degrees and not above 95 degrees. The liquid should be shaken from time to time during a fortnight; then the residue is filtered and pressed. This tincture has a distinct odor of violets, and a harsh and bitter aftertaste.

In order to impart a bouquet to the wine, the tincture of iris can be used alone in very small quantities; rarely more than one tenth of a pint to twenty-two gallons of wine are used. Very often some few drops of essential oil of cloves, or of some other aroma, are added.

Raspberries.—The preparation of alcohol with the flavor of raspberries is very simple. Ripe raspberries are chosen, picked over, stemmed, and introduced into a barrel with a large bunghole. Twenty-two pounds of the berries are mixed with two and a half gallons of spirits of wine (85 degrees); they are macerated for twenty days, then the liquid is drawn off and filtered. Thus obtained the liquid possesses a very agreeable aroma and a rosy color. Now the berries are crushed, a new quantity of brandy (strength 50 degrees) is added, and the maceration continued for a month; after that the residue is pressed. This second extract has an odor and taste less delicate than those of the first extract; it is also deeper colored. This liquid should be filtered, or, even better, distilled on the water bath; thus the essence of raspberry is obtained. The first extract is preferable in all respects. This aroma is generally used alone; a good deal of it is used in the manufacture of sparkling wines. Sometimes other aromas are mixed with the essence of raspberries. The quantities of raspberry essence which are used to impart an artificial bouquet vary, according to the flavor of the infusion, from one twenty-fifth to one fifth of a pint to twenty-two gallons of the wine.

Essence of Cloves.—The essential oil of cloves can be extracted either by pressure, maceration, or by distillation. In commerce, this oil occurs under the name of *essence of cloves.* To produce the bouquet this essence or concentrated spirits of cloves are used. To obtain the latter, crushed cloves are distilled with alcohol of 85 degrees. The proportions are ten ounces of cloves to one gallon of alcohol. In default of a still, the aroma can be extracted by infusion, macerating three ounces of crushed cloves in one quart of alcohol of 85 degrees. The mixture should be stirred and filtered at the end of eight days.

Essence of cloves alone is seldom used. By adding a very small quantity of this aroma to the iris extract, a good result is obtained, and the perfume mixes better with the wine, because the essence of cloves is heavier than water.

It must be said, however, that it is never desirable to have the aroma of cloves the prevailing one.

Vine Blossoms.—This perfume is collected while the vines are in bloom. The blossoms are extracted with alcohol of 85 degrees; three ounces of blossoms to one gallon of alcohol are used. After eight days the liquid should be filtered or distilled on the water bath. This essence, which is very volatile, is used in the proportion of one tenth of a pint to twenty-two gallons of wine.

Reseda.—It is difficult to obtain the essence of reseda; the flowers should be picked off the stems and put on cotton or pieces of wool, which have been impregnated with oil. This oil should not be allowed to become rancid (ben-oil is chiefly used for this purpose); the flowers are renewed at the end of four days until the cotton or wool is very fragrant. It is pressed afterwards and the oil shaken with alcohol of 85 degrees. The essential oil dissolves in the alcohol, which is afterwards separated from the ben-oil. Thus a reseda extract is obtained which is used in quantities of one tenth of a pint to twenty-two gallons of wine. Most frequently it is mixed with other perfumes.

Muscat Nut.—Muscat nut is used, either in the form of the essence, which is obtained by distilling over a fire, in quantities of half a pound in two and one fifth gallons alcohol; or in the form of extract made in the same proportions.

Bitter Almonds.—The aroma of the bitter almonds is due to one of the most violent poisons (hydrocyanic acid). It is extracted by different methods. The essence occurs in commerce. It should be used in infinitely small quantities.

Sassafras.—The wood and bark of sassafras, rasped or in shavings, come from the sassafras tree, which grows in America. They possess a sweet odor, and contain an essential oil, which is extracted by distillation, and which is also met with in the trade.

We have tried to use other aromas; but they are only useful as auxiliaries of the three first mentioned—iris, raspberry, and clove—because their odors differ considerably from the natural bouquet of mellow wines.

All these preparations only give to the wine a bouquet and an aroma which is peculiar to the substances used. They can never impart the real bouquet which characterizes our fine wines; it is impossible to imitate this bouquet, and one may only succeed in flattering the sense of smell. The artificial aromas are very volatile, and it is even not necessary to be a connoisseur in wines to recognize them. Nervous persons are even inconvenienced by them, particularly if the aroma is very strong.

When an artificial bouquet has been added to a wine, it will still retain its peculiar taste; the odor is changed; but taste the wine without smelling it and you will recognize its peculiar flavor. The artificial bouquets do not keep as well as the natural ones, and they even decrease gradually in strength. In the course of time they volatilize, contrary to the advertisements sometimes published by interested parties who sell them.

The trade journals abound with advertisements of persons who pretend to be wine experts, chemists, etc., and who manufacture bouquets bearing the pompous names: Flavor of Medoc, Bouquet of Bordeaux, of Pomard, Extract of Bordeaux, etc. All these products of charlatanry are advertised as imparting to the most common wines the true flavor of Medoc, as improving and strengthening the wines, etc.

In the wholesale and retail trade of France, irisated wines are rarely met with. It is true, some merchants and wine makers use the iris to improve their poor wines; but a poor wine will always remain a poor wine, because it has no flavor and strength, and because, notwithstanding the advertisements, the *flavor of Medoc* has given them no flavor; this is, by the way, very fortunate for the vineyardists of the Medoc; for nothing else would be left to them, but to burn their vineyards if it were possible to impart the flavor of the Medoc to wines of the poorest class.

Upon the whole, the use of artificial bouquets is a process of improvement which does not come up to the practice of blending with wines which possess a good deal of bouquet and flavor—among these latter certain old white wines occupy the first rank. Among the artificial aromas, the alcoholic infusion of raspberries is the one which modifies the taste of the wines in their first years most successfully.

CHAPTER VIII.

THE SOPHISTICATION OF WINES.

General observations. Means of detecting sophistications. Artificial coloring of wines.

What has not been written on "the adulteration of wines in the trade!" The wine merchants of the great consuming centers, particularly those of Paris, have been accused of the most culpable frauds, as for instance of manufacturing wine without grapes, fermenting solutions of sugar and tartaric acid and coloring these liquids by extracts of logwood. It has also been said that the harshness imparted to the mixtures by artificial coloring matter was neutralized by the addition of litharge.

These accusations seem false and exaggerated. The authors, who say those things without weighing their words, ought, before making such statements, to consult the official tasters of wines and the chemists—whose duty it is to analyse the seized wines—and the decisions of the Courts. They could also satisfy themselves by an experiment that such a mixture does not possess the taste of wine, and that they can thus form nothing but a disgusting beverage and a violent poison. It is besides an easy matter to detect such fraud, in that it is sufficient to pour a few drops of sulphuretted hydrogen-water into a wine which contains litharge in order to obtain a black precipitate, or at least to impart to the liquid a brownish color.

There are undoubtedly sold in Paris wines of very poor character and wines which are very weak. There may be found in the records of the Courts many judgments against merchants who were guilty of having sold wines which contained a greater or smaller admixture of water. It is seldom that the chemical analysis of the wines seized reveals in them unwholesome matters. There have been, however, effected seizures from the stock of ignorant merchants who had no idea of the composition and of the treatment of wines, and who had therefore used, to impart color to their wine, mixtures of alum or other substances; but, truly speaking, they did not know the properties of these substances.

On the whole, those having in charge the ordinary wines retailed by the great firms in Paris, know that no wholesome substance can ameliorate a wine, nor even conceal its defects. More than three fourths of the sentences for adulterations are based on the admixture of water to the wines.

We can positively state that in the viticultural centers of the Gironde and in the neighboring wine-producing countries, the wine producers and merchants are too much interested in finding the best possible means of producing good wines, to spoil them by sophistication with unwholesome substances, the use of which does not even conceal their defects. There are found, however, in certain places, wines with a very low percentage of alcohol, which possess a too *smooth* taste. These wines are often diluted by an admixture of very weak wines or "piquettes," sometimes of water; but this kind of adulteration is to be met with only among very common wines which are destined for the provincial retail trade. Producers of good brands know by experience that such dealings would close the markets for their wines, instead of bringing them a profit. This accounts for the fact that in the markets of Bordeaux and of the south of France, sophisticated or simply watered wines are so seldom met with; but notwithstanding this, we are going to point out the most practical methods of detecting these frauds. We must first state, however, that all these methods are of little use to the men who are themselves in the business, for by tasting, by distilling the wine in small stills, and particularly by comparing the samples with faultless typical wines, they can guess the nature of the fraud, though they cannot determine exactly the quantity of the admixture. The adulterated wines met with most frequently, particularly those which are found in countries where wines are rare and high priced, are: 1, wines which have been diluted with water; 2, artificially colored wines; 3, natural wines mixed with fermented liquids, which are made from sugar, glucose, brandy, cider, etc.

One must have a great deal of experience in tasting in order to be able to define exactly the kind of admixture. This is particularly difficult in cases where the quantity of the admixture is small, or when the sophisticated wine has been made a long time ago and since fined. In such a case the mixture has become more intimate and a good part of the insoluble matter precipitated.

Diluted Wines.—It is possible to recognize a diluted wine on tasting, if one has an experienced palate. This kind of wine is thinner, and the more water added the less bitartrate of potash and other organic salts they contain in proportion. In Paris the tasters, who are commissioned by the police department to inspect the liquor trade, enjoy a

somewhat discretionary power, so far as the provisional seizure of wines is concerned. They have the right to seize every wine which they think is diluted with water, whatever its alcoholic strength may be; otherwise, many of the retailers would think it feasible to dilute wines which contain from 12 per cent to 14 per cent of alcohol, to an average strength of 9 per cent to 9½ per cent, and would consider themselves safe from legal process, under the pretext that the wines of the central provinces of France do not contain much alcohol; but the administration justly punishes the fraud whenever it detects the presence of water, even if the alcoholic percentage of the diluted wine is higher than in the ordinary wines. A warning to the perpetrators of frauds!

It is possible to ascertain exactly the quantity of water with which a wine is diluted, by evaporating a portion of the same to dryness. In the residue will be found (together with the organic salts which each wine contains) the lime salts which were in the water that was added. If the chemical composition of the water is known, it is an easy thing to calculate, from the weight of the lime salts present, the quantity of the water of dilution. If the water was added recently the analysis gives positive results; but in case it has been added long ago, so that a portion of the salts has had time to be precipitated, the results of an analysis are less trustworthy. At any rate, it is a delicate operation, which can be done only by an experienced chemist. If the water which has been used does not contain any lime salts, but the same salts which are peculiar to the wine, the tasting and the chemical analysis can give but certain results.

There are certain countries, far distant from wine-growing centers, where much diluted wine is met with in the trade. Particularly in the colonies, a great many wines from the south of France are sold, which are diluted with water and artificially flavored. These wines are sold under the name of "*petit Bordeaux*" (little Bordeaux).

If distilled water has been used for the purposes of dilution, it is, unfortunately, very difficult to detect the fraud.

Artificial Coloring of Wines.—In the vineyards of southern France no artificial substances have been used for imparting color to the wines, because the "black" wines, *i. e.*, those which are deeply colored, abound. In certain regions of central France and of foreign countries, colored infusions are made use of. Such infusions are made from elderberries, etc., sometimes with water and sometimes with alcohol. The manufacturers add to these infusions a strong dose of alum in order to revive and to preserve the color, which otherwise would soon become insoluble. Such infusions or "lakes" become very unwholesome through this addition.

Besides fruit juices as coloring matters, there have been used extracts of beet roots, of litmus, of cochenille, of tincture of orchil in paste, of cudbear (coloring matter extracted from orchil), of the leaves of the red marsh-mallow—and besides a great number of blue vegetable colors which are turned red by tartaric acid: ammoniacal cochenille, specially prepared caramels, called "colorine of aniline," etc.

These various organic or mineral colors cannot preserve, in most instances, their red tint as long as the natural color from the skins of the grapes. In the wines, they are rapidly precipitated with the lees, and are always injurious to the frankness of the taste. Many of these

artificial colors require an addition of alum, and the result is that they become unwholesome. Sometimes foreign wines are met with, and imitations of sweet wines, which are colored with the help of ordinary caramel. This substance has the inconvenience of imparting to the wines a taste which is not very agreeable, and sets them to fermenting if they do not contain enough alcohol. Still it is not unwholesome.

On the whole, as we have already said, white wines which are artificially colored cannot become red wines if they lack in tannin; they neither possess the taste nor the composition of red wines, and a trained eye and palate recognize easily either their artificial color or their characteristic taste of white wine. Certain unwholesome colors, in the composition of which arsenic enters through fuchsine, do not differ in their tint from the new wines, and do not leave a bad taste on the palate; but they separate out very rapidly, and besides, it is very dangerous to use them.

M. Fauré, the able chemist, who has analyzed the principal wines of the Gironde, gives a simple and easy method of ascertaining the presence of artificial colors. According to this authority, it is only necessary to add a little tannin to the suspected wine, and to treat it with a big dose of gelatine. If the color of the wine is natural, this treatment will decrease its intensity, while organic colors which do not have their origin in the skins of the grapes, are not affected. Unfortunately, in the majority of cases, the sophisticators use the artificial colors as an auxiliary, in order to increase the natural color of the blends made from various wines; the addition of a small quantity of foreign matter is in such a case very hard to detect.

The considerable difference which exists in the values of ordinary white wines and of red wines with a fine color (sometimes the latter commands double the price of the former), keeps a great number of wine makers busy looking for artificial colors to change the white wines into red ones; and it can be said that this is the sophistication which is most commonly met with, particularly if the prices of the wine are high and the vintage was a poor one. The trade should be on the lookout, and not only refuse to handle the wine, the genuineness of whose color is suspected, but should also cause analyses to be made of all questionable samples. We have already given one method of testing. Mr. Schrader has also given, at a conference which took place in Bordeaux, in February, 1874, a process for the detection of artificially added colors in the wine. It is remarkable for its simplicity, and is based on the fact that most of the artificially added colors, instead of combining with the wine, mix only, more or less intimately with the same, and remain quasi suspended in the liquid; so that by changing the density of the latter very gradually, they separate out.

This is the way the experiment is conducted: A small flask is filled with the suspected wine and suspended as straight as possible by the neck with the help of a string, then it is slowly lowered into a great flat-bottomed glass three quarters full of water. Care should be taken not to shake the water; also, the height of the latter should cover the open neck of the flask. Owing to the fact that it is specifically lighter, the wine rises slowly to the surface, where it forms a distinct layer. If the red wine is pure, the water at the bottom of the glass remains colorless; if it is artificially colored, the color diffuses, on the contrary,

throughout the liquid, and the water at the bottom of the glass appears colored.

In order that the experiment should succeed perfectly, the density of the wine should be taken into account. Its specific gravity must be less than that of the water, as is generally the case with ordinary wines; but for sweet wines, which are heavier than water, this test cannot be applied in the same way. In this case it would be necessary to immerse the flask with the neck downwards to the bottom of the glass; the wine would sink to the bottom, and if the color were artificial, the diffusion of the same would take place from the bottom to the top.

Certain wines, which have a very deep natural color, give doubtful results, if they are very new, even though they may be pure. This is due to their specific gravity, which does not differ much, and sometimes not at all, from that of the water. More trustworthy results will be attained by clarifying and fortifying the samples of wines which are too young.

The different coloring matters which are introduced into the wine possess different tints, and may be recognized by various reagents. In the following is described the peculiarities of artificial coloring matters commonly used in our day:

Red Caramel, or Colorine.—This substance has the consistency of a thick syrup. Before adding to it the wine it may be dissolved either in water, white wine, or in alcohol. Its tint is not changed. The liquid may be neutral, as ordinary water, or strongly acid. The coloring power of this substance is very great; three pints of it are sufficient to impart a deep color to a barrel holding fifty gallons. The tint which is obtained by the use of this substance does not show, even to the best trained eye, any difference from the natural color of a fine new wine. It is a frank wine—red, wherein no violet tint predominates. So far as the taste is concerned this substance does not possess either that of the ordinary caramel or any other appreciable taste. The samples which came under my observation were sent from a manufactory in the department of the Seine-Inferiéure.

The white wines which are colored with this substance show a peculiar behavior. They are tolerably clear, if the artificial color has not been introduced too long ago; but on being mixed with red wines of natural and light color, they become turbid, and by the process of fining a large portion of the color is precipitated. It can be easily recognized in the lees, which have a slimy appearance.

The chemical analysis of this substance has been made officially on the occasion of a lawsuit before the Court of Libourne. The case originated under the following circumstances: Several soldiers in the garrison of Libourne showed symptoms of an indisposition which puzzled the medical men. These latter investigated the reasons of this indisposition, and came to the conclusion that it was due to the partaking of an excess of unwholesome wine. Samples of wine were taken from the places the soldiers used to frequent, and it was found that the wine was colored artificially. Analysis demonstrated the presence of fuchsine and of arsenic in the substance. The retailer had bought these wines from a wholesale house which had used this substance believing it to be harmless, as advertised and commended by numerous medals which the manufacturer had obtained for the preparation at different exhibitions.

This substance has been investigated by several chemists—among them M. Carles, apothecary in Bordeaux, who characterizes it in the following terms:

"On calcination this coloring matter yields a little ashes, which are neutral, and consist almost exclusively of oxide of iron and sulphate of lime. The color of the preparation becomes yellow by the addition of alkalies (potash, ammonia), or of mineral acids (sulphuric, chlorhydric); it is not affected by perchloride of iron. Treatment with alkali, ether, and acetic acid, show it to be composed of caramel, glucose, and a salt of rosaniline."

The rosaniline of commerce often contains arsenic, and it is therefore dangerous to use this substance.

It can be recognized by M. Fauré's method, which consists in discoloring the wine by treatment with a strong dose of gelatine.*

A sample of the suspected wine is well shaken with the same volume of gelatine solution, and then filtered; the pure wine loses its color almost entirely, and turns decidedly green on the addition of volatile alkali (ammonia). On the other side, the wine which is colored by the rosaniline caramel is not changed by alkali, but according to M. Carles it regains its color on addition of an excess of acetic acid (white vinegar).

Elderberries.—Since the last century dyes have been manufactured from elderberries; they have been particularly used to color champagne of a pale red color. The manufacturers add to these dyes alum, in order to make the color more stable; but there is not enough of it manufactured to bring it into common use among the makers of white wines. M. Carles makes use of the following method to recognize the presence of the extract of elderberries. He takes a white porcelain pot, or large coffee cup which holds half a pint of water; pours into the water thirty to seventy-five grains of the suspected wine, and stirs the mixture with a spoon. The wine which contains an admixture of the extract of elderberries, turns green after a few minutes, while the mixture of pure wine and water does not change its color. Likewise those which are colored by "colorine," rosaniline, and cochenille. The wines which are colored with elderberries turn distinctly green on addition of volatile alkali; give, with acetate of lead solution, a pale red precipitate, and become blue on the addition of acetate of alumina. When the extract of elderberries does not contain alum, it is not unwholesome; but it imparts to the wine a strange taste, besides the color has too much of a violet tint, and is not durable.

Bilberries.—Their color is not a frank one; it is a red which can be recognized at the first glance, which has little intensity and not much brilliancy. It turns green on addition of acetate of alumina. Its presence may be recognized by the experiment we have mentioned in the beginning of this chapter.

Ammoniacal Solution of Cochineal.—The color which is obtained by the use of this substance is not frank; it is changed by tartaric, acetic, and other acids from violet to a brick-red. The orchil, the cudbear, and logwood extracts show the same peculiarites. These coloring matters dissolve in alcohol, and impart to it a violet tint, which changes into a

* M. Carles has obtained the same results by using albumen; he uses the half of the white of an egg well beaten with its own volume of water, on three ounces of wine which is to be treated.

frank red on the addition of a little sugar-caramel. In the wine, the presence of the organic acids changes this tint into brick-red in the case of the three first colors, and to yellow in the case of the latter. M. Carles pours ten to twenty drops of the wine which is thus colored into a porcelain dish holding half a pint of water. After a quarter of an hour the wine has assumed a violet tint, owing to the presence of the bicarbonate of lime in the water. In summarizing, we must say that wines which are colored with the above substances are not salable.

Aniline Red.—This color is somewhat related to the caramel we have spoken of, and contains always more or less arsenic; it is therefore unwholesome. This red has a very brilliant tint, and a mixture of the same with caramel from molasses is the most powerful coloring matter known. M. Falières, of Libourne, has invented a very sensitive method of detecting it: seventy-five to ninety grains of the suspected wine are introduced in a flask which holds a little less than two cubic inches; a small excess of volatile alkali is added, and the flask filled up with pure ether; after shaking the mixture well it is allowed to settle. The colorless base, *rosaniline*, dissolves in the supernatant ether. A portion of this ether is decanted into another flask, and some drops of acetic acid (white vinegar) are added. If the wine contains rosaniline, the ether will assume a pale red color. The reaction will be much more distinct if the ether is shaken with a few drops of water, which takes up all the color. This color shows the same behavior as the red caramel we have spoken of, and separates out of the wine in the same manner.

It is evident from all we have said that *none of these colors are stable*, and that a great number of them are unwholesome. The wines which are colored by these artificial means are in most instances the worst kind of white wines.

MIXTURES OF FERMENTED LIQUIDS.—It has been sometimes found that certain wines contain an admixture of cider; of liquids fermented from glucose syrups; of weak brandy, etc. These different mixtures can be easily recognized on tasting if they form a considerable part of the wine. The difference in the composition of the residues or of the extracts indicates to the chemist which of the foreign matters has been introduced.

All of these fraudulent processes are punished in France by the law as falsification of food.

Besides falsifications, giving a wine a false name and false origin constitutes an offense which is punished by the law, because, of whatever the quality the merchandise may be, there is an imposition practiced on the quality of the goods sold. The habit of the public in designating certain goods by the name of the country which produces the best quality, seems to excuse, in a measure, this giving of false names, but a merchant who possesses any self-respect would blush to designate ordinary wines by the names of those celebrated. They know that by cheating their customers they expose themselves to the danger of losing both reputation and trade.

CHAPTER IX.

COMMERCIAL ANALYSIS OF WINES.

Physical properties and commercial value of wines. General composition of wines; their chemical analysis, etc. The component parts of the wine considered separately. The physical analysis of wine. Analysis of sweet wines and cordials.

PHYSICAL PROPERTIES AND COMMERCIAL VALUE OF WINES.—The physical analysis of wine consists in the judgment of a connoisseur, corroborated by the use of scientific instruments. With the help of a trained palate it is possible to recognize by the looks, odor, and taste the different and slight gradations, qualities, color, flavor, bouquet, mellow or faulty taste, and likewise the defects of wines.

Fine wines of the highest quality can be appreciated only by the connoisseur. Qualities which are particularly appreciated by trained connoisseurs, and which in the aggregate make a perfect wine, cannot be measured and defined by chemical means. These qualities consist chiefly in the intimate combination of the elements which compose the wine, in the fineness of the bouquet, combined with a decided and sweet flavor, a mellow, velvety taste, and a brilliant color. Chemical analysis can give but a very poor idea of these qualities unless aided by tasting. This is so very true, that between the analysis which the most skillful chemist can make of our finest, but *young* red wines, and that of the ordinary wines from the south, which have gone successfully through vinification, and which have the same alcohol-percentage, there would exist but apparently unimportant differences, while in reality the value of the first wine may be twenty times greater than that of the other.

GENERAL COMPOSITION OF WINES, THEIR CHEMICAL ANALYSIS, ETC.—The complete chemical analysis of a substance consists, as is known, in isolating the principles or elements which compose it; in a word, to decompose it. A great number of chemists have devoted their attention to the more or less complete analysis of wines of all kinds. Chemists and observers agree that all natural wines contain about the same elements. The analysis of a good, ordinary wine can be summarized thus: it contains per liter, alcohol, 10 per cent; water, 90 per cent; extract, about 20 grammes. In this extract are contained the coloring matters, the organic salts, of which the principal is the tartar (bitartrate of potash), which alone represents a weight of from five to six grammes; mineral salts, acids (tannic, acetic, carbonic, tartaric, etc.); traces of ethers, aldehyde, essential oils; mucilages, pectine, and ferments. These substances are met with in various wines. The exact knowledge of the combinations formed in wines, and which impart to them their various flavors and bouquets, is still very imperfect. It is possible or has been thought possible to analyze more or less complctely these compotent parts, but their synthesis has not been effected up to the present day.

The analysis of wines cannot be carried on in the same systematic manner as that of inorganic matters. Those who have devoted themselves to œnology know, that from the moment fermentation has transformed the must into wine, and until it begins to decompose, continuous changes go on in its taste, color, flavor, bouquet, and general composition.

On tasting a well made wine which is several years old, it is possible to recognize that certain substances which it contained originally have vanished; but as a result, compound substances which did not exist before have been formed; they impart to the wine a flavor and bouquet which are entirely different from those it had on leaving the fermenting tank. A portion of the organic and mineral salts, ferments, organic albumen, coloring and mucilaginous matters, various acids, tannin, etc., have been eliminated, either owing to the natural clearing, or to treatment with finings, or to racking. These slow but progressive, and, so to speak, daily changes, make a regular analysis impossible, because a majority of the substances which compose the wine are liable to become precipitated and form compound bodies, or to become insoluble. The alcohol combines with the acids, forming ethers, which produce the bouquet that did not exist before. On account of these constant changes it is impossible to define precisely the composition of a wine, and even in the most complete analyses there are many things which escape the notice of even the most attentive analyst.

It is also known that the composition of the same brand varies with each vintage, according to the degree of maturity, the stock and age of the vines, the duration and processes of vinification, the various methods of treatment, etc.

THE COMPONENT PARTS OF WINE.—From the commercial standpoint, the object of vinification should be to obtain wines which contain a sufficient quantity of preserving elements to fit it for good keeping and proper aging. The chief preservative elements of the wine are alcohol and tannin.

Alcohol.—The general properties of alcohol are well known—it imparts to the wine strength, heating, and intoxicating qualities. The maximum of alcohol which a wine can attain by the fermentation of rich musts is between 15 and 16 per cent. If the percentage is a higher one it is *due to the artificial addition of alcohol.* In proportion as the wine ages a portion of the alcohol evaporates, or it may become oxidized, and form acetic acid if too much exposed to the air. But when the wine is too old, when it degenerates, the alcohol undergoes a total decomposition without coming in contact with the air. This alteration has been particularly noticed in bottled wines.

Tannin.—Tannin or tannic acid is, after the alcohol, the most useful element in the preservation of wines, in the union of their component parts, in the maintenance of the coloring matters found in solution. It eliminates the ferments by forming with them insoluble compounds; it promotes the clearing of wines by combining with the finings and particularly with pure gelatine. Tannin is a substance of astringent, harsh taste, which is met with in several plants and which occurs in various forms—according to its origin. It is found in large quantities in the stones, skins, and stems of the grape, in the bark of the oak, in the gall-nut, quinine, caoutchouc, and in many other substances.

This substance is frequently used in medicine and the arts. As medicine, the tannin from gall-nuts is most frequently used. In trade two varieties of tannin are met with, whose difference is produced by the method of extraction employed. Gall-nut tannin extracted by ether is purer, but often retains an ethereal odor and taste. Tannin extracted

by alcohol has no odor and should be preferred for the treatment of wines.

As it is sometimes difficult to obtain this substance in places distant from large cities, it is possible to introduce a large quantity of tannin into ordinary white wines by using the tannin which is contained in the grapes. This tannin can be obtained by extraction with boiling water. For this purpose we use seeds which have not yet undergone fermentation. For this purpose they are roughly crushed and boiled in a kettle for several hours. Afterwards the water should be decanted, and if not immediately required for use, should be fortified with alcohol up to 17 degrees. The liquid should be filtered and will then keep very well. If it is desired to increase the tannin in ordinary white wines, about forty pounds of crushed raisin seeds are introduced into a barrel of clear wine, which should be at least one year old; after two months draw off the wine.

In case it be found impossible to obtain grape seeds, oak bark can be used; either digest it in the cold with white wine or infuse with hot water. Oak bark has a rather strong woody taste. When possible, it is more advisable to use grape seed, which imparts to the wine a natural astringency. It is possible by studying varieties to increase in a natural way the quantity of tannin without using artificial means, and that is in all respects the best plan.

Among the varieties which are grown in the Gironde, there is particularly one which contains in its seeds and skins a considerable quantity of tannin. This is the *Verdot* (particularly the *Petit Verdot*). Wine makers who produce mellow wines, difficult to preserve and export, may improve brands by introducing into their vineyards a certain quantity of this excellent variety; particularly if they have spots well exposed to the south, for this variety matures rather late.

The barrels have also a great influence on the quantity of tannin which a wine contains. For those poor in this substance, new barrels from Bosnia oak should be selected, and rinsed simply with cold water. Barrels which are made from American woods, or which have already done service, should never be used in this case.

The fermentation of mellow wines should not be conducted in the same manner as that of the wines which we wish to become rich in tannin. In the latter case the grapes in the fermenting tank should be completely crushed, the stems should not be removed, and they should be kept immersed in the must during the whole period of fermentation, which should be attentively watched in order to draw off the must as soon as it is over. The supply of tannin may be recognized as inadequate if gelatine remains suspended in the liquid. White wines which have undergone fermentation in old barrels are generally those most lacking in tannin. Red wines generally contain enough tannin, owing to their long contact with the pomace in the fermenting tank, particularly if *new barrels made from oak* have been used. In wines of high quality, which are destined for bottling, an excess of tannin would impart too much harshness; this inconvenience can be avoided by stemming the berries completely before fermenting; avoid, too, as much as possible, their crushing, and draw off the must as soon as the first violent fermentation is over. If a wine contains too much tannin it has a harsh and rough taste during the first years; but after awhile this substance becomes precipitated, perhaps by forming insoluble

compounds, or even becoming transformed, as is generally suspected, into gallic acid. It is easy to precipitate a large portion of the tannin from wines which are too harsh, and which are destined to be used immediately. But this should never be done with wines destined for a sea voyage, or which are light colored, because, though the removal of the tannin helps to age them, it has, also, the disadvantage of discoloring them.

Free or Combined Acids.—The taste, the flavor, and the bouquet of wines can be modified by the free acids, the essential oils, the ethers, and by the various compounds which they contain, or which are being formed. The free acids which have the greatest influence on the taste are tartaric, malic, and several other higher acids, which are formed before the wine reaches its maturity, as well as acetic and carbonic acids. The two first mentioned acids are found particularly abundant in the imperfectly ripe grapes, and they impart to the wine a taste of harsh tartness.

Acetic acid develops chiefly in wines whose vinification has been faulty and neglected.

Carbonic acid is found in new wines which undergo an after-fermentation. This acid, which imparts to the sparkling wines the property of foaming, should be removed from mellow wines which are intended to be aged under proper conditions.

Flavor and Bouquet.—Flavor differs materially from bouquet. The flavor is an aromatic taste which may be agreeable or disagreeable, and which is judged by the palate. Bouquet, or aroma, is an odor, and can be appreciated only by the sense of smell. The flavor of each kind of wine, which is the characteristic taste, is appreciated when the liquid is introduced into the mouth, just as any other kind of dish is tasted. The non-odoriferous substances are those which contribute to the formation of the flavor. This is the reason why a wine may have a flavor and a sharply defined taste, but no bouquet.

The cause and origin of flavor is due to the particular taste of the different grape varieties in conjunction with the modifications which may be produced by the nature of the soil, by the site of the vineyard, methods of vinification and of conservation.

There is not much known of the formation of the bouquet. Certain œnologists believe it to be due to the essential oils which are chiefly contained in the skins of the grapes, and which, it is alleged, are dissolved during the process of fermentation. We do not exactly share in this opinion. We do not say that the skins do not contribute to the modification of the aroma, and consequently of the bouquet; but we do not admit that the bouquet has its seat in the skins, like some of the essential oils in the skins of certain fruit. That being the case, the wine would have a bouquet on leaving the fermenting tank; but it is known that this quality is acquired only after several years.

White wines which ferment in casks without coming in contact with the skins and seeds, ought, according to this theory, be deprived of aroma; but experience has proved that these wines do acquire a flavor and a bouquet, more or less developed according to the variety of grapes employed. It can hardly be said that Sauterne, Yquem, and certain other white wines, are deprived of this quality. It is even possible to find white wines which are possessed of it even in a higher degree.

We believe that the bouquet which (we find it here necessary to

remark) develops only after the lapse of several years, is of a very complex nature, and is formed from substances which exist chiefly in the must, but which produce an aroma only after entering into certain combinations. These combinations are chiefly formed of alcohols and acids, and result in ethers or essential oils. The latter becomes more perceptible to the sense of smell after a considerable portion of the lees has separated out. It is our opinion that the skins contribute to the modification of the flavor rather than of the bouquet. The flavor and bouquet can be modified and improved by an intelligent selection of varieties which give the finest and most aromatic grapes, by selecting favorable sites, and such manures which do not increase the taste of the soil by their putrid odor.

As far as artificial means of imparting bouquet are concerned, we refer the reader to the chapter on *Blending*, where we emphasized that in this way only poor results are obtained.

Organic and Mineral Salts.—The organic and mineral salts which wines contain are numerous; but, with the exception of tartar (bitartrate of potash), they have not much influence on the taste. Tartar is that salt which is found in the greatest quantity in all wines. It is known that this salt separates gradually from the wine, and becomes precipitated with the lees, or adheres (mixed with coloring matters) to the walls of the barrels. New wines contain, on the average, five grammes per liter; but this quantity decreases with time. Tartar imparts to the wines a slightly acid taste, particularly if it is contained in abundance. It possesses the property of giving increased activity to fermentation, and of dissolving the ferments. It becomes, thus, very useful in the process of vinification. The other organic and mineral salts are also precipitated to a great extent with the lees. Thus it happens that all old wines contain much less salts than new wines.

Mellow, Oily, Velvety Taste of High-Class Wines.—The fine red wines of the Medoc and of other vineyards of the Gironde, as well as the fine Burgundy wines, retain, on aging, a decidedly fruity flavor, an oily consistence, and a mellow, velvety taste, which together with their peculiar flavor and bouquet, are the delight of connoisseurs. This mellow, velvety taste is produced only in those years when the grapes had a chance to become perfectly ripe. In bad years, when the grapes do not attain their perfect maturity, the wines may acquire more or less flavor and even some bouquet, but they are dry and lack mellowness. Many ordinary wines which have gone through the process of vinification in the proper way and date from a good vintage, possess as long as they are young, a decidedly fruity taste; but in most of their kind, this mellow taste does not keep, but vanishes gradually with time. In high-class wines, however, which date from good years, the mellow and oily taste is more prominent after the lees has settled than when they are young. We believe the substance which imparts this mellow and oily character to the wines is produced by a modification of the grape-sugar. This opinion is strengthened by the fact that mellow wines which are stored in cellars with irregular temperature, undergo in the end an imperceptible fermentation, particularly if they are in their first or second year and if they still contain some ferments. Very often—after such an imperceptible fermentation—the oily consistence disappears and the wines become dry. This fact makes us believe that under the influence of ferments and variations of temperature this substance undergoes the same transformations as the sugars.

Physical Analysis of Wine.—The main object of the physical analysis is to affirm the facts which have been ascertained by tasting. An expert can determine the alcohol-percentage of a wine by the use of his palate alone, even to within a fraction of a per cent.

Alcohol.—The alcoholic strength of a wine can be recognized by distillation. If this operation is carried on with care, the results are very exact. The distilling apparatus of Salleron is at present universally used. The distillation can be performed with less than sixty cubic centimeters of wine. In order to make use of this apparatus the wine to be distilled is poured into a small measuring cylinder, filling it up to a certain mark. Then this quantity is poured into a small retort, and the distillation started. The distillate is collected in the same measuring cylinder. When the latter is half filled up to a mark which is scratched in the glass for this purpose, the distillation is stopped, and the cylinder filled with distilled water up to the first mark to which the wine stood originally. The liquid is now well shaken, and a thermometer and an alcoholimeter are introduced into the same. After a few minutes both instruments are read, and the alcohol-percentage calculated from a table, which is specially prepared for this purpose.

Intensity of Color.—It is very easy to get at the intensity of color by comparing it with other wines, if one has a trained eye, and particularly if the examination is performed in a bell-mouthed silver cup.

If the samples are in a turbid condition, it is difficult to judge them. To get an exact idea of their color they should be fined with a very small quantity of albumen (white of egg) and well shaken for a minute. If there is reason to believe that albumen would not produce the desired effect, a small quantity of gelatine dissolved in a few drops of warm water, to which is added a pinch of tannin, should be used. After this the wine becomes clear in a day or so, and it is then much easier to estimate the intensity of its color. Should there exist some doubt concerning the origin of the color, the test should be applied which we have mentioned in the chapter on *Sophistications*.

Presence of Tannin.—Before exporting a wine it should be ascertained if it is fit to undergo the trials of a long voyage without spoiling, and if its color is stable and does not become precipitated too easily. If the wine originally contained the proper quantity of tannin, the color keeps better during a sea voyage. In order to ascertain if this is the case, either a barrel should be fined with double the usual amount (two tablets) of gelatine, or a bottle with the same quantity of gelatine in proportion; and after clearing, the difference in color will appear. If the gelatine has been precipitated, and if the wine is in a bright condition, it is a sign that it is well supplied with tannin. Should it not contain a sufficient quantity of tannin, the gelatine will remain in suspension. The trial may be completed by exposing a bottle filled up to the cork to a temperature of 120 to 200 degrees for one week, or, if it is summer, expose it to the sun's rays. Wines which withstand such a trial can be shipped without fear.

Saccharine Matters.—In order to ascertain how much sugar sweet wines contain, a very simple operation has to be done. A certain quantity is measured in a graduated cylinder, poured into a dish and evaporated—either on the free flame or on the water bath—to half of its bulk. This extract is now poured again into the cylinder, and the latter filled with water up to the mark indicated by the wine originally; the

contents should be well shaken and the specific gravity ascertained by means of a saccharometer. Before using this instrument, the liquid should have cooled down. It is even advisable to let it stand for twenty-four hours, in order to allow it to separate from the tartar and the organic and mineral salts, which could possibly exercise an influence on the instrument. If a distilling apparatus is at hand the operation is still simpler. First the wine is distilled, and its alcohol-percentage ascertained by distilling off half of the wine; the other half, which remains in the retort, is poured back into the graduated cylinder, and this is filled with distilled water up to the mark which the wine had reached originally; after shaking well the saccharometer is used.

By calculating the sugar from the reading of the saccharometer, the salts which the wines contain are not taken into account. In some varieties these salts increase the reading of the saccharometer by a whole degree. Care should be therefore taken, if full-bodied and young wines are under examination, to deduct one degree from the reading. For purely commercial purposes there will be obtained in this way more correct data, particularly if the liquid has not been allowed to stand for twenty-four hours, and to get rid of the salts by crystallization.

Analyses of Sweet Wines and Cordials.—The cordials are composed of alcohol, sugar, and flavor. The extra fine cordials are more valued, for their better flavors are combined. Their aromas are sweeter, and they are older, thus they acquire a mellow taste, which is the result of the intimate combination of their aroma and their alcohol with sugar. This combination can be effected only with time; for, indeed, so long as they are new they always possess—regardless of the care exercised in their manufacture—a little harshness and roughness, which is due to the superabundance of aromatic substances, and also to an empyreumatic taste, resulting from recent distillation. The excellence of the taste of extra fine cordials can be appreciated only by tasting. Aside from the taste, it is necessary to ascertain the quantity of alcohol and sugar which they contain, in order to determine their commercial value, and in order to know, in case they are destined for export, if they contain enough alcohol to stand the trials of a voyage.

Alcohol.—The quantity of alcohol which these sweet liquids contain can be ascertained by distilling them in the same manner as described for ordinary wines. The Salleron apparatus can be used for this purpose.

Sugar.—The sugar in the sweet wines can be determined in the same manner as prescribed for ordinary wines.

CHAPTER X.

EXPERIMENTS ON ARTIFICIAL AGING.

The different methods in use; their effect on mellow and sweet wines. Fining. Continuous agitation. Exposure to the sun in closed vessels (wooden or glass). Application of heat (pasteurizing); its influence in the conservation of wines of the Gironde.

Wine attains the full development of its qualities only after a certain lapse of time. On leaving the fermenting tub it is far from showing the aroma, color, and flavor which it acquires after a few years, or, perhaps, even after a few months only.

The degree of perfection which a wine can attain is determined by the relative proportions of the different substances which compose the same. Certain wines, which are very poor in preserving substances (alcohol and tannin), begin to decompose immediately after fermentation. These wines, the value of which is not at all increased by time, should be consumed *as soon as the after-fermentation is over*. It is useless to age them. Other wines, which contain a sufficient quantity of these substances, require several years for their complete development.

In general, the bouquet and flavor of wines develop perfectly only when they have cleared perfectly—that means, when they fail to deposit any more insoluble matters, such as mineral or organic salts, ferments, and coloring matters, by remaining undisturbed for several months.

The old wines differ, as is well known, from the new ones of the same character by their color, their aroma, and by their flavor. These differences are due to various reasons:

The *color* is pale in an old wine on account of the coloring matter having partly separated out. This is due to the formation of several insoluble compounds which are carried down with the lees.

The *aroma* of the old wines is more fragrant, because *ethers* have formed through the combination of alcohol with the acids which are contained in the wine, and because the odor of the aromatic substances is no longer covered by the carbonic acid, which was liberated after the first fermentation of the young wine was over.

The difference in the flavor is due to several reasons, such as to the separating out of a large quantity of mineral or organic salts, which have been carried down with the lees, and which have become insoluble by their combination with the tartaric, acetic, and malic acids. This difference is *also* due to the precipitation of a part of the color.

All these facts tend to show that the wine, on getting older—providing it has been properly treated—contains less coloring matters (organic and mineral salts, free or combined acids, tannin, ferments, mucilaginous substances, alcohol) than it did shortly after fermentation. This result is obtained with the aid of time and labor judiciously applied. Several operations hasten the aging of wines: (1) Repeated treatments with finings; (2) Continuous agitation; (3) Exposure to the sun; (4) Application of heat. We are going to examine one after another the various changes which these processes cause the wine to undergo, varying with the composition of the latter.

Aging by Means of Treatment with Finings.—We have already shown the action of the various finings upon wines of different character, and the changes thus produced according to the chemical or mechanical influences which they experience. We have also shown the disadvantages which result from repeated finings. Indeed, the clarifying substances which act most energetically—such as pure gelatine—on account of their being coagulated and precipitated chiefly by tannin, carry down with the latter into the lees a part of the coloring matter, which is intimately associated with the tannin. The result of such a forced treatment with the finings is that the wine becomes poor in color and in tannin and that thus a part of its chief preserving element is removed. Another result is that a certain quantity of mucilaginous substances is also precipitated, and these latter, as is well known, give the fruity taste and the oiliness to the wine. The wine has been thus

certainly aged, but it has not preserved its mellowness like wines which age naturally; on the contrary, it becomes harsh and dry.

Repeated and energetic treatments with finings should be applied only to very harsh and deeply colored wines or in cases when there is no time to wait for the transformation of the tannin into gallic acid.

Aging by Continuous Agitation.—The pitching and rolling of ships impart to the wines which make a sea voyage a continuous movement. This movement is augmented by allowing the casks to go imperfectly filled. During long sea voyages this prolonged movement modifies the character of the wine either in a good or in a bad sense. It renders insoluble a part of the coloring matter, precipitates or brings into suspension a part of the organic and mineral salts, and changes a part of the tannin into gallic acid; ethers are formed, and the wines become more or less turbid. Should the wine be rich in color, tannin, and alcohol, it will improve in quality; it will age much quicker than the wines of the same character which remain in the cellar. Should it be, on the contrary, poor in preserving materials—tannin and alcohol—it will arrive very turbid and ready to undergo the putrid fermentation. The expansion and the contraction which are caused by the variations of temperature which occur in the hold of a ship during a voyage through extreme latitudes, increase the precipitation of insoluble matters, the solution of salts, etc. *The movement* alone, *will do the same*, even if the temperature remains uniform. We were able to ascertain this fact by the following: While visiting the vineyards of the south, in 1854, a proprietor in the neighborhood of Castel-Sarrasin gave us his wines of the vintage of 1853 to taste. These wines were kept in small tuns of equal size, were all of the same kind, dating from a poor vintage, and were made from grapes which had grown on young vines belonging to an ordinary variety; they were very poor in alcohol, color, and tannin (they contained 8 per cent of alcohol). Their color, though not deep, was still brilliant enough, but the wine in two of these tuns showed a dull, leady color; they were also turbid, and possessed a slightly putrid odor. And still it was the same wine as in the other tuns; but these two tuns had been filled by means of a suction and forcing pump, and this operation had made them turbid, and had started in them, owing to their deficiency in alcohol and tannin, a complete decomposition by precipitating a part of their color. On the contrary, the wines which had not been fretted remained bright. Numerous and practical experiences tend to confirm the theory—*that the aging by means of agitation and sea voyages* is unfavorable to the weak wines which lack in preserving elements, while it favors the development of wines which are *rich in tannin and alcohol*. In order to obtain good results, the wines which are destined to make a voyage for aging purposes should first be thoroughly cleared by the application of finings and by racking. The barrels should be strong and iron hooped, and should not be completely filled—this in order to facilitate the motion of the liquid. For the same reason bottled wines similarly shipped should not be filled up to the cork. After the voyage the wine should be allowed to rest. If it has made the voyage in barrels, it should first be slightly fined; if it was bottled, it should be decanted, in most instances. If it is desired that the voyage should not age the wine, precautions of an opposite kind have to be taken—the barrels and bottles should be accurately filled.

We have compared the wines of Cos-Destournel 1848, of Saint Trelody and of Quinsac of the same year which were bottled and shipped in 1851 on board of a vessel bound for Calcutta, with the same wines which had remained in the cellar. In 1852 the bottles which had made the voyage came back; considerable sediments had formed in them, particularly in the Quinsac. They were placed again in the cellar. A month later they were tested (without having been previously decanted), in order to compare them with the wines which had remained in France. The differences in the color, in the aroma, and in the flavor were very great. Those which had made the voyage had acquired a brick-red color; their bouquet was much more developed, and they had more aroma. The wines which had remained in the cellar preserved their brilliant red color; were more fruity, mellow, and oily, and appeared consequently less old than the former.

Aging by Exposure to the Sunlight.—This method of aging was known to the ancients. Galienus, a celebrated Greek physician, and a contemporary of Marcus Aurelius, relates that in his time (in the year 180 of our era) the Romans used to age certain wines by exposing them to the sunlight on the roofs of their dwellings. The reason that this method of aging is so little used now, is due to the fact that it cannot be applied successfully to every kind of wine; particularly wines which contain less than 15 per cent of alcohol. These are little fit to undergo such a treatment. We are going to explain under what circumstances and on what kinds of wine this method can be used with advantage. We must, first of all, state that the direct action of the sun's rays on bottled wines precipitates their coloring matter rapidly, and that this action is more marked on partially filled than on completely filled bottles.

Bottled wines which are wrapped up in paper, or wines in wood, age much slower under the same conditions. We were able to confirm the truth of this statement in 1854, when we received from Spain a sample box of red wines of the vintage of 1853; there were two samples of each type. After having tasted them, and ascertained how much alcohol they contained, the bottles were corked again and placed vertically on a shelf near a garret window, fully exposed to the sun. It was in the end of the month of May. The other bottles which had not been opened, and which were wrapped in paper, were placed horizontally on the same shelf. The wines possessed a deep color, and had on the average 15 per cent of alcohol; they had a rather sweetish taste. Three months later came the consignment of wine, the sample of which we had selected; we were very much astonished to find in the remainder of the bottle which we had tasted a straw-colored wine, by no means deteriorated, but possessing a very marked taste of "rancio." The wine in the bottles which had remained full, and were wrapped in paper, had retained its red color and peculiar taste, but nevertheless appeared older and less colored than the portion which had been in the cask.

It is evident that this result can be attributed to the joint action of the sunlight and of the oxygen of the air which was contained in the bottle that had been opened.

These Spanish wines, which showed high alcohol-percentage, and which still contained some sugar, had, therefore, improved on being exposed to the sunlight in partially filled bottles.

If this process is applied to the wines of the Gironde, or similar wines, they are spoiled instead of being improved. The following experiments prove this:

November 16, 1866, we placed on the roof of a cellar in Bordeaux, well sheltered from rain and wind, but exposed to the sun, four bottles of white glass which were only half filled with wine, stoppered with large corks of the best quality. These samples remained on the roof until the eighteenth of February; they had, therefore, the best opportunity to undergo changes of temperature ranging from 32 degrees to 77 degrees. In the following are given the results of their tasting, and of their comparison with the wines which had remained in the cellar:

No. 1. Wine of 1865; had a frank taste, ordinary color; alcohol, 10 per cent. The same after insolation in well corked and half-full bottles, flattish, moldy; slightly altered taste of an old wine; color, paler; considerable sediment.

No. 2. Wine of Sainte-Eulalie d'Ambere's, 1865; very fine color, excellent taste, decidedly mellow; alcohol, 10 per cent. The same after insolation, acid; considerable sediment.

No. 3. First crop Bassen, 1865; brilliant color, fruity taste; alcohol, 10 per cent. The same after insolation, flattish and acid; voluminous sediment.

No. 4. Wine of Banjuls, 1863; red, sweet wine; frank taste; alcoholic strength, 17 per cent. The same after insolation, decided taste of "rancio;" brick-red color; considerable sediment; frank taste. *The taste appears to be finer, more aromatic, and older* than that of the wine which had remained in the cask; it also has less sugar than the latter.

These experiments show that insolation can be employed with advantage only in the case of wines which contain more than 15 per cent of alcohol, also of sweet wines and of white wines which are fortified up to 18 per cent of alcohol, and which are destined for the production of wines after the fashion of Madeira; but wines with about 10 per cent of alcohol cannot be treated by this method of aging without being damaged more or less, on account of the oxidation of a part of their alcohol *to acetic acid.*

Aging by the Application of Heat.—Heat has been applied in different ways and in different degrees to the aging of wines. It produces more or less important changes in their composition, either improving or deteriorating them: First, according to the wines submitted to its action, whether in presence of the air, or in closed vessels, and depending how full the vessels are; second, according to the degree of heat to which the wine is exposed; third, according to the time the wine is heated; fourth, according to the composition of the liquid, and to the percentage of alcohol contained.

The first experiments, on heating wines, are lost in the mist of antiquity. Galienus, whom we have already mentioned, relates that in his time the Romans used to heat the wine in stoves. The Cypriotes, the Greeks, the Italians, the inhabitants of Madeira, and the Spaniards, age their wines in places which have a very high temperature. Modern authors mention several methods of heating; but they do not specify the wines to which the application of heat is advantageous or injurious; and yet this is the essential part of the question.

Numerous experiments enable us to affirm that heating, if it goes

higher than 86 degrees, is injurious to the fine and *mellow* wines of the Gironde, and to any wines with a delicate bouquet which do not have more than 12 per cent alcohol. This is true, regardless of the manner in which the heat is applied.

The fine wines which have, at the same time, an aromatic flavor and bouquet, a fruity taste, and are decidedly mellow, get, through heating, a certain taste of "rancio;" but at the same time they become dry, lose their mellowness, their freshness, and contract a "*cooked*" taste, which changes their character and makes them resemble the wines from the south of France.

Conditions of Exposure to Heat.—Wines which are exposed to the action of heat in direct contact with the air, lose a part of their alcohol by evaporation; the oxygen of the air makes them lose a part of their color, and, if the contact with the air is a prolonged one, they become weaker and undergo a radical change. If exposed to the heat in closed vessels which are not quite full, they lose a part of their color; and if they contain more than 16 per cent of alcohol, they contract a taste of "rancio." But if they are low in alcohol, and remain long under these conditions, the oxygen transforms a part of their alcohol into vinegar. In well filled and closed vessels, they do not undergo many changes, particularly if the heating does not last long, and does not go beyond 158 degrees; a small part of the coloring matter is always precipitated, however, and the taste is perceptibly changed. No matter how rapidly the heating has been done, the wine will always acquire a "cooked" taste and a slight odor of lees.

Influence of the Degree of Heat.—Whatever the wine may be which undergoes this treatment we should avoid applying too much heat, because there is danger that some of the substances which are in solution may be either precipitated or disassociated, and that thus the natural taste of the wine may be changed. In order to obtain good results we may adopt the extreme limits of 113 degrees and 158 degrees.

Influence of the Duration of the Heat.—The higher the temperature to which the wine is raised, the shorter the heating period should be.

Influence of the Character of the Wines.—Wines which improve most on heating are the sweet wines with a high percentage of alcohol. In order that they should not suffer changes on being heated they should contain at least 18 per cent of alcohol. As the alcohol gradually evaporates during the heating of the wines, its alcoholic strength should be ascertained from time to time and enough alcohol should be added afterwards to make up for that which has evaporated.

Preservation of Wines by Heating.—The learned chemist, Pasteur, once communicated a memoir on acetic fermentation to the academy, and published in 1866 an investigation, "Studies on Wine," in which he describes a process of preserving the wines by the application of heat. One of his processes consists in submitting the wines in loosely corked bottles to a temperature of 122 degrees to 152 degrees for a few minutes. Let them cool, cork and store them as usual. According to this honorable chemist the changes which the wines undergo are chiefly due to microscopic organisms; the germs of these organisms exist in all fermenting liquids, and a temperature of 131 degrees to 152 degrees is sufficient to kill them. Wines which have undergone such a treatment can be exposed to the air, according to the same authority, without being liable to the great changes they would suffer previous to such treatment.

Pasteur's communication gave rise to many discussions among the wine experts. It is said that the application of heat for purposes of aging wines has been known since long ago, and that it has been made use of in Cette to age the wines artificially. Indeed, several houses in Cette have used this method, but have at present partially given it up. The following contains the details of the method used by the Cette wine makers. The new wines were transferred into tubs which contain a worm in connection with a boiler. With the help of steam the temperature of the tub was raised to 77—86 degrees, and so continued for one week. The next week the temperature was raised to about 104 degrees, and was gradually increased so that at the end of three weeks 158—167 degrees were reached. The wine then became brick-red in color; it was allowed to cool and blended with other wines, because it usually acquired a bad taste. The application of heat hastens the aging of wine but makes it lose its oily consistence, and the precipitation of the coloring matter imparts to it a common taste of the lees.

Pasteur explained that by the use of his method he did not pretend to age the wines, but only to preserve them.

As far as we are concerned we do not advise the application of heat in preserving or aging wines of high quality of the Gironde. According to our opinion the quality most important to preserve in our wines is their mellow taste. The germs liable to rise and destroy the mellow taste and oily consistence of the wines by producing an after-fermentation may be more easily separated from the wine if it is allowed to rest at a low and uniform temperature, and the racking be judiciously applied, than if heat is brought into play. Care should be taken to use sulphured casks, and to avoid the free access of air. It should be further remembered that the wines of the Gironde which are made from good varieties and with the necessary precautions are not liable to undergo any injurious changes; they keep and improve better if the usual methods are employed, than if artificial means are used to hasten their aging and clearing.

Experiments on Pasteurizing Wines.—In the following are recorded the results of pasteurizing various wines in a cellar in Bordeaux, November 16, 1886:

The wine was transferred into Bordeaux bottles, corked, wired, and afterwards put into a basket, with an upright set of eight pigeon-holes for the bottles. This basket was placed in a boiler whose bottom was covered with straw. Among the bottles there was one which was filled with distilled water, and which contained a thermometer. This bottle was corked in the same way as those which contained the wine. The boiler was then filled with water up to the neck of the bottles. The basket was taken out only when the temperature of the water had reached 125.6 degrees, after a slow and gradual heating.

The wines submitted to this experiment were the following:

No. 1. Wine possessing a frank taste; rather dry; color ordinary; perfectly transparent; 10.4 per cent of alcohol.

No. 2. Wine of very frank taste; decidedly mellow; fine color; alcohol, 10 per cent.

No. 3. Wine with brilliant color; fruity taste; aromatic; alcohol, 10.2 per cent.

After the pasteurizing, a bottle of each number was placed in a cellar

which had a constant temperature. At the same time a bottle of each kind of wine which had not been pasteurized was placed in the same cellar. In order to recognize the influence of the pasteurizing on the keeping qualities of the wine in contact with the air, the contents of each heated bottle were divided into two parts; one half was placed in a garret in an open bottle, which was only lightly covered, the other half in a hermetically sealed bottle. Together with these bottles was placed one bottle of the wine that had not been pasteurized.

Each number represented five different subdivisions:

(*a*) A sample of the wine bottled and stored in the ordinary way.

(*b*) A sample of the pasteurized wine bottled and stored in the cellar, under the same conditions.

(*c*) Sample of the wine exposed to the air in a bottle only partially filled.

(*d*) Sample of the pasteurized wine exposed to the air in a bottle only partially filled.

(*e*) Sample of the pasteurized wine in a bottle only partially filled and hermetically sealed.

In order to control accurately the results of these experiments the wines remained in the cellar, or were thus exposed, from November 16, 1866, to February 18, 1867. Now, before judging ourselves, we decided to have them tasted by two cellar foremen of Bordeaux, expert tasters.

The wines were given to them in the following order, without telling them which were the pasteurized wines or those which had been exposed to the air.

No. 1. Pasteurized wine exposed to the air in a partially filled bottle.

Wine (not pasteurized) exposed to the air under the same conditions.

Pasteurized wine in a corked bottle, half full, and placed horizontally.

Pasteurized wine kept in cellar, in full bottles, placed horizontally, and well corked.

Wine (not pasteurized) kept in cellar, in full bottles, horizontally placed.

The tasters find that the three first samples have undergone changes but not in the same degree (ignoring the fact that they taste like the same kind of wine). These three samples are turbid. The unpasteurized wine contains a large amount of acid, and has lost more color. The pasteurized wine is flattish, but is less changed. The pasteurized wine which was in a partially filled but well-corked bottle shows signs of a beginning change.

As far as the same wines, pasteurized and not pasteurized, but in full bottles, are concerned, the tasters agree that the natural wine has a finer taste than the pasteurized sample. The difference in the color is not noticeable.

No. 2 (Same method of experimenting). The pasteurized wine which was exposed to the air is flattish and turbid. The wine which was not pasteurized, but exposed to the air, is deeply changed and more turbid than the first one. The heated wine which was in corked but half-filled bottles is turbid, flattish, and acid. In the full bottles the difference is very small.

The wine which was not pasteurized has a finer taste; the pasteurized wine has deposited more sediments in the bottles than the non-pasteurized.

No. 3. The pasteurized wine which had been exposed to the air is

flattish, but not acid; considerable sediment. The wine which had not been pasteurized is more deeply altered. The wine which was pasteurized in partly filled bottles is flattish and turbid, but not acid. In the full bottles the pasteurized wine appears to be richer in body but of more common taste; by moving the bottles, the pasteurized wine becomes turbid, while the unpasteurized wine remains clear.

The following conclusions can be drawn from these experiments:

1. That pasteurized wines stand the access of the air without undergoing such a radical change as wines which have not been treated in this manner; but nevertheless they assume, through prolonged contact with the air, a flattish taste and become sour and moldy even in closed vessels which are not completely filled.

2. That the fine and aromatic wines, if pasteurized and protected from the access of the air, have generally after this operation a more common taste than the unpasteurized wines which are preserved in the ordinary way. We have not yet been able to ascertain if the pasteurizing has an appreciable influence on the precipitation of the coloring matter and salts during sea voyages. We have noticed, however, already, that after performing this operation a deposit is formed, and that the color of certain wines decreases. It is, therefore, advisable to store them after pasteurizing in a cool cellar, and to rack them carefully, shutting out the air as much as possible. Without this precaution one would run the risk of sending off wines which would arrive at their destination more or less turbid.

Aging by the Combined Use of Several Processes.—Before subjecting any wine to the different processes which we have described, care should be taken to precipitate the matters which they keep in suspension, by a thorough treatment with finings. Artificial methods of aging should never be applied to the first-class red or white wines of the Gironde; because if even an early development of the bouquet is obtained, there is always the danger of destroying its most precious quality, their mellow taste. To-day the connoisseurs in wines do not look for wines which are dry and harsh to the palate, even if they possess a bouquet; such wines are only too frequently met with. They value particularly wines which, notwithstanding their age, have preserved their fruity, velvety taste and oily consistence, which can be preserved only by storing the wines in cellars with a regular temperature, and in air-tight vessels, by racking at the proper time, and by keeping the air off as much as possible, and by avoiding as much as possible the application of finings.

The wines which improve most by the successive applications of several of the above described processes are: First, the very harsh and deeply colored wines; second, the fortified wines which contain at least 18 per cent of alcohol; third, the sweet fortified wines which contain from 18 to 20 per cent of alcohol.

The fortified, dry, or sweet wines age very rapidly, if they are first agitated, then exposed to the sunlight, and afterwards subjected to a thorough treatment with finings; but it is important that they should be fortified as soon as the alcoholic strength decreases through evaporation, for if they should have less than 15 per cent of alcohol, instead of acquiring bouquet they would become "pricked." It is also often necessary to increase the sugar of the sweet wines which are aged in this way.

CHAPTER XI.

EMPTY BARRELS.

The influence of different kinds of wood on the durability of the barrels and on their fitness to resist the humidity of cellars; influence of various substances contained in the staves, which are dissolved by the wine. Preparation and preservation of new casks and barrels. Treatment of empty barrels, which have been used already; changes which they are liable to undergo; acidity, moldiness, rotting; how to contend with these changes; inconvenience of using casks which have undergone a change. Brandy barrels.

INFLUENCE OF DIFFERENT KINDS OF WOOD ON THE DURABILITY OF THE BARRELS, AND ON THEIR FITNESS TO RESIST THE HUMIDITY OF CELLARS—INFLUENCE OF VARIOUS SUBSTANCES CONTAINED IN THE STAVES, AND WHICH ARE DISSOLVED BY THE WINE.

Oak wood yields to the wine several substances, of which the most important are tannin, gallic acid, mucilage, organic albumen, and several other substances which possess a pronounced odor and taste. All timber from this species seems to contain the same soluble substances; but there are, among the different varieties of oak, some which contain a much larger quantity of soluble substances than others. The Bosnian oak contains the largest amount of soluble matter. A short time after the introduction of this variety into France the wine makers began to fear for the future of their wines. They noticed the large quantity of dissolved matter which gave to the new wines a strong woody taste and much harshness. But to-day, thanks to a long experience, we know that staves which are made from this wood, far from doing any harm, improve the wine by promoting the settling of the lees. We know also that the odoriferous substances which they contain do not possess any disagreeable properties. However, the material for staves which is most valued on account of its agreeable odor, is that from the north of France—from Dantzic, Stettin, and from Angoulême. Casks which are made from American timber do not contain as much soluble matter as other varieties; but still they are considered by the French wine makers to be the least fit for storing wines and alcohols.

On aging, the wine gets rid of a large portion of the dissolved matters, which are neutralized by combining with various substances found in the wine. Thus the tannin, which contributes to the keeping power and clearing of the wine, is partly precipitated by combining with various substances contained in the wines or introduced with the finings. The organic albumen is precipitated chiefly by the alcohol, and thus also helps to clarify the wine. The odoriferous substances in the wood increase the bouquet of the wine. Upon the whole, the preserving of new wines in new casks of oak wood is favorable to their clearing, because of tannin and organic albumen contained in the staves; but it should be borne in mind that these wines should be transferred to the new casks immediately after leaving the fermenting vats, and before the after-fermentation is over; otherwise their bright condition would suffer, and they would acquire a strong woody taste which would last for several months. After a certain lapse of time the woody taste will disappear.

Preparation and Preservation of New Casks and Barrels.—New casks after leaving the coopers's shed have only one small gimlet hole;

this hole is made by the workmen to test the air-tight condition of the cask. New casks, which are destined to contain new wines, should be stored in a place which is not too moist. We should be equally careful not to keep them in places which are too well ventilated. In moist places the casks burnish and the hoops become rusty or rotten; in places which are too warm and exposed to dry air the wood shrinks and they get too dry, making it necessary to cooper them up well again before using.

The most convenient place for storing empty barrels is a dry cellar, which should be kept closed. The casks are placed on benches or blocks of wood; those of the lowest row with the bunghole upwards and those of the upper rows with the bunghole downwards, in order that the dust should not blacken the insides nor penetrate through the gimlet hole. If new casks are not used for several years it is advisable, in order to prevent the inside becoming moldy, to make the bunghole, and burn a piece of sulphured wick inside. Then keep the cask well bunged, and repeat this operation every six months.

The day before pressing the young wine in the fermenting vat, or before transferring it into barrels, if it is a white wine, the bungholes should be drilled out with a good wimble, and fitted with bungs wrapped in a linen cloth. Pour into each cask from one to two gallons of boiling water; then drive the bung in again, and the cask or barrel is rinsed by agitating. The boiling water and the steam expand the air in the barrel, and in the pores and in the smallest fissures of the staves, making it thus possible to see the least flaw. After having thus rinsed the barrels, the water should be thrown out before it becomes quite cold; after that, the casks should be rinsed again with cold water, and drained. Before filling them with wine, it is advisable—if they are destined to hold red wines of the best quality—to moisten their insides with a glass of old brandy; in which case, care should be taken that all parts of the staves are reached. These precautions are, as a rule, sufficient for the preparation of the casks which are destined to hold red wines. We have already spoken of casking white wines.

If it should happen that very fine flavored or old wines have to be kept in new casks, the greater portion of the soluble matter in the staves could be extracted in the following way: In each cask a couple of gallons of boiling lye is poured. This lye can be made from ashes or potash; and in case these materials are not at hand, from any other alkaline substance, such as slaked lime, pulverized chalk, etc. It has been noticed that alkaline substances dissolve out of the staves a larger quantity of matter than pure water. After having rinsed the barrel or the cask several times with the lye, it is poured out, and the rinsing is continued with a new quantity. Afterwards, boiling water is used to remove the alkaline matter. This water is poured out while it is still hot, and replaced by a gallon or a gallon and a half of cold water, acidified by one fifth of a pint of sulphuric acid. After the treatment with acidified water, hot water is used to remove the acid. Again, before draining, the cask is once more treated with cold water. These various manipulations can be avoided by wine-seasoning the new casks which are destined to hold old wines, to do which, new barrels are first treated with boiling water, in the manner we have described above. Then they are filled with ordinary wine of the same color as that which they are destined to hold. For this purpose, also, ordinary white wines may be

used. In a fortnight these wines will absorb most of the soluble matter from the staves.

TREATMENT OF EMPTY BARRELS WHICH HAVE BEEN USED ALREADY; CHANGES WHICH THEY ARE LIABLE TO UNDERGO; ACIDITY, MOLDINESS, ROTTING; HOW TO PREVENT AND COMBAT THESE CHANGES.—As soon as a barrel has been emptied, it should be rinsed several times with water; care being taken to regulate the work according to the amount of lees which the wine contains. When the water runs off entirely clear, the barrel is drained for a few minutes; a small piece of sulphur wick is introduced through the bunghole and burned; after which the barrel is put aside to dry. After twenty-four hours again a small piece of sulphur wick is introduced and burned; this time the barrel should be bunged as hermetically and as carefully as if it were filled with wine. The barrel having been treated in this manner, for some months will experience no change, provided it is kept in a cellar, the temperature of which is uniform, and neither too dry nor too moist. Should the necessity arise of keeping this barrel a long time without further use, it would be necessary to repeat the sulphuring every three months, and to keep it hermetically bunged. There are two methods of burning the sulphur wick in the empty barrels The first consists in introducing the wick by means of a hooked wire, or, still better, on a small pan; when the sulphur has burned down, the pan is drawn back and the barrel bunged. The other way to do it is to cut out a piece of the sulphur wick about four to five inches long; one end of this piece is cut into a bird's-mouth joint and the wick on this end cleaned from the sulphur which adheres to it; the other end is now lighted and introduced into the bunghole, while the portion of the wick which is free from sulphur is pressed with the hand against the side of the bunghole; in the meantime the bung, which has been previously wrapped in a linen rag, is introduced into the bunghole and hammered in. That the combustion of the sulphur is going on in the interior should be ascertained by applying the ear to the staves of the bulge. A hissing sound produced by the droplets of sulphur which fall on the inner walls of the bulge should be heard. If no sound is heard it means that the wick has ceased to burn; in such a case it would be necessary to ascertain this fact by taking out the bung cautiously.

By this method the combustion of the sulphur is going on in the barrel without the surrounding air having access to it; the result is, that with the same quantity of sulphur it is possible to impregnate the barrel with a larger quantity of sulphurous acid than by burning with the bung open. This makes a barrel fit to keep longer without undergoing any change, because the oxygen of the air which it contained is more thoroughly exhausted than when the air had access. The use of this method, however, offers some inconveniences. As the burned wick remains sticking to the walls of the bunghole, there is always danger that it may fall into the cask and communicate to the wine a disagreeable taste, unless great care is exercised in taking out the bung; sometimes, also, it happens —if the casks are not bunged with great care—that the rag around the bung burns, and that then the gas and the expanded air find an outlet and carry with them the flame of the wick, which carbonizes the walls of the bunghole. These are the reasons which generally make people use the wickholder.

Always avoid leaving the casks empty for several days without rinsing them; they should be cleaned without delay, as soon as the lees are emptied. The casks should be drained in the cellar on benches; if they are allowed to drain in the sun, particularly if they have not been previously sulphured, the action of the heat transforms the alcohol which adheres to the interior sides of the staves rapidly into acetic acid, and barely a few hours suffice to acidify the air which they contain, and even the interior surface of the staves.

Changes Which the Casks May Undergo; Their Treatment; Inconveniences of Using Casks Which Have Undergone a Change.—The casks which, after having been emptied, are neither rinsed, sulphured, nor bunged, are apt to undergo various changes, which make them more or less unfit for holding wine, particularly wine of high quality. These changes are: flattish odor, acidity, mold, and rot.

Flattish Odor—Origin and Treatment.—The cause of the flattish odor is due to the liberation of carbonic acid, which is generated in the cask. This odor is chiefly met with in casks which have remained bunged without previous cleaning. It reminds one, more or less, of stagnant lees which are slightly acid. The sulphur cannot burn in such casks. It is very easy to expel the carbonic acid. As this gas is much heavier than the air, it suffices to place the cask over the drain, with the bunghole downwards, in order to renew the air completely. The cask is allowed to remain in this position for one or two hours, and is then rinsed carefully. Should the cask be acid, and smell flattish at the same time, the following treatment should be adopted, in order to rid it of acidity.

Acidity—Cause, Origin, and Treatment.—This alteration is produced, if an empty cask remains several days without being attended to. The staves of the cask, which are impregnated with wine, become acid on coming in contact with the air, which latter oxidizes the alcohol, and transforms it rapidly into acetic acid. The higher the temperature the more rapid is this transformation.

Under such conditions the interior of the cask has a very decided acid odor. The treatment of this evil consists in neutralizing or in extracting completely the acetic acid which has sometimes penetrated deeply into the pores of the wood. The following shows how this may be accomplished: After having rinsed the cask with water, a hot lye solution should be applied; this solution may be prepared from wood ashes (preferably from the ashes of vine shoots)—potash quicklime. The cask should be rinsed several times with this lye, which should be thrown away before it cools completely; then, if it is possible, the cask should be filled with fresh water, which should remain in it three or four days. After that the cask should be emptied and rinsed in the ordinary manner. The water should not be allowed to remain longer in the casks, for it would become slimy, and in the end putrefaction would set in.

Moldiness—Cause, Origin, and Treatment.—The mold which forms on the inside of the casks is due to their prolonged contact with a moist atmosphere, as commonly met with in the majority of cellars. Thus, whether the bungs have been neglected, whether there are defective staves, or even if the hoops do not fit tightly, this moist air penetrates them and, even though sulphur has been burned in them, moldiness sets in it at last. If they have not been sulphured the mold appears much sooner.

The mold is a kind of whitish moss consisting of microscopic fungi, the bad taste and disagreeable odor of which are due, it is generally supposed, to the presence of an essential oil. Moldy casks can be recognized by their odor. The simplest way to treat casks which are thus affected is to take out the bottom and examine them; if the moldiness appears to be superficial, it can be easily removed with the help of water and a stiff brush; if, after thorough rubbing and washing, the inner surface of the staves assumes again the natural color of the wood impregnated with wine, this is a sign that the wood has not been attacked; it is sufficient in this case where the bottom has been taken out, to place the cask on its side, and let it dry; it may even be exposed to the heat of the sun without fear of acidity. When thus cleansed, the bottom of the cask is replaced, and the whole rinsed in the ordinary way. If, on the contrary, the staves remain brown after washing and rubbing, they are more than moldy—they are more or less deeply rotten.

Rotting—Cause, Origin, and Treatment.—Rotting is the decomposition of the wood. Its cause is the same as that of moldiness, viz., moisture. A cask whose inner surface is rotten cannot be used for holding wine. If the staves of a moldy cask show brown spots, they should be scratched off, and all the wood removed which is not sound or which is without its natural color; without this precaution, whatever may be done, it will be only possible to conceal the bad taste without removing it. If a cask needs to be entirely peeled of its moldy skin, the inner side of the staves should be slightly carbonized before putting on the finishing touches. It is hardly necessary to add that the use of doubtful casks for wines of good quality should be avoided, even if the casks have been previously treated in a suitable manner. For if the wine remains a long time in the casks it penetrates deep into the pores of the wood. Thus, one is apt to spoil the wine, and to lose, by ill applied economy, the value of a good barrel of wine. Such inferior casks, if it is at all necessary to make use of them, should be employed for holding only the poorest kind of wines.

Brandy Barrels.—These barrels do not require other manipulations, after having been emptied, than to be bunged and removed from the influence of humidity; the alcohol which impregnates their staves is sufficient to preserve them. It is detrimental to drain and dry them completely. If they have remained empty for a long time they are slightly moistened with alcohol in order to prevent molding. The new barrels which are destined to hold brandies are rinsed and drained for at least twenty-four hours. When their staves are dry they are moistened with one or two glasses of alcohol, which is allowed to remain in them; they are then securely bunged and shaken well. We should avoid leaving water in these barrels, for if once the alcohol is evaporated they undergo, if exposed to humidity, the same changes as the wine casks. It is important that the casks which have been moistened with alcohol should be placed outside the rooms where the wine casks are stored, in order to make the sulphuring of one of them by mistake impossible; such a mistake may produce a terrible fire, particularly if the casks were lately emptied.

All these remarks apply to casks which have been already used for holding alcohol or which are destined for new brandies; that is, for those brandies which have just left the still and which are not to be sent off

immediately. Should the necessity arise of sending off brandies in new barrels it will be useful—in order to prevent the "woody" taste—to leave the casks full of water for three or four days and to treat them afterwards in the same manner as we have shown above for wines. Ordinary wines may be kept in barrels which have already contained brandy and even olive oil, provided it was not rancid; but we should avoid the use of such casks for wines of high quality.

So far as barrels are concerned which have been used for rum, kirsh, vinegar, absinthe, bitters, or any other liquor of penetrating odor, they are entirely unfit to hold wines, on account of the essential oils, the entire removal of which is quite impossible.

CHAPTER XII.

LIQUEUR, OR SWEET WINES.

General composition. Various processes of vinification. Treatment. Aging. Clarification. Manufacture of "liqueur" wines with the help of similar wines. Artificial sweet wines. Vermout.

SWEET WINES are those which, after having gone through their violent fermentation, either in tanks or in casks, still contain a certain quantity of sugar in solution. In order that such a result may be reached, it is necessary that the must should be very rich in sugar. It should have from 16 degrees to 25 degrees, according to the Baumé spindle. The wines uniting these conditions contain from 15 per cent to 16 per cent of pure alcohol, without having been fortified. The sugar they contain gives them a higher specific gravity than that of water. By extension of the term, foreign wines, which do not contain an appreciable quantity of sugar, but which have been strongly fortified, are also called sweet wines. Such are *ports*, dry Madeiras, sherries, etc. These, in reality, are dry, but have been artificially fortified with alcohol. Some varieties of these wines are found, to which a small quantity of sugar has been added, in order to destroy their dryness and render them more mellow; notwithstanding this, they do not taste sweet. There are other varieties which are fortified while they are still a little sweetish.

The process employed in making these wines varies in each establishment.

First process.—The density of the must may be augmented in a natural way by allowing the grapes to become overripe. In warm and dry climates the berries dry up partially, and a certain portion of their water evaporates.

Second process.—In cooler and moister climates the grapes first rot and then are wasted by the sun; in this case, also, their water evaporates. This can be seen in the vinification of the wines of Barsac, Monbazillac, etc.

Third process.—In some vineyards of Spain, the drying of the grapes is hastened by twisting the stems of the bunches; the rising of the sap is thus stopped.

Fourth process.—In Andalusia the must is concentrated by ebullition. This process is also used in the south of France.

Fifth process—After the well-matured grapes are picked, they are dried

on screens, or on straw in the sun; they are not pressed before their skins become wrinkled. In this way in Germany, Hungary, Alsace, etc., the *straw wines* are made.

Sixth process.—The grapes are dried in an oven or in a drying stove.

Seventh process.—Alcohol is added to the must before the fermentation has started, so that the liquid contains from 18 to 20 per cent of alcohol; in this way, by preventing fermentation, the saccharine matter is preserved.

Eighth process.—Lastly, dry wines are blended with syrup prepared from raisins or with concentrated and fortified musts.

The dry "liqueur wines," that means those that are completely through with their fermentation, receive an addition of brandy, either after leaving the fermenting tank, or after their violent fermentation in the barrel is over.

Treatment of Sweet Wines; Their Conservation.—The various processes of vinification of sweet wines produce enormous differences in the character of these wines. The treatment should vary according to their alcohol-percentage. It should never be forgotten that the "liqueur wines," be they dry or sweet, which contain less than 16 per cent of alcohol, require *the same treatment as ordinary* wines, if it is desired that they undergo no changes. Without this precaution they are *susceptible to the same influences*, that is, liable *to ferment, to become turbid, and at last to become pricked.*

In order that "liqueur wines," be they dry or mellow, natural or artificial, may be preserved in storehouses with uneven temperature, in upright standing bottles, or in partly filled casks, it is necessary that they should contain at least 18 per cent to 20 per cent of alcohol. If they have this percentage, particularly if they still contain some sugar, a high temperature will age them, and they will keep quite well without requiring constant attention. The barrels should be quite full, but there is no need of filling them up oftener than once a month. But before subjecting them to these conditions it is indispensable to ascertain *exactly their alcohol-percentage.*

Aging.—As we have already said, a high temperature is favorable to the aging of "liqueur" wines, *provided their alcohol-percentage is not too much lowered by evaporation,* which must be ascertained and watched.

Fining.—The clearing of sweet wines may be effected in two ways: by the use of finings, or by filtration. Both processes are often used at the same time. The kind of finings most suitable for each variety of wine should be chosen. If the wine is dry, and contains a considerable quantity of alcohol—as, for instance, the Madeiras, ports, etc.—the clearing with substances which contain albumen, or the white of egg, is perfectly successful. If these substances cannot be had, fresh blood should be used, but that only with ordinary wines. When the wine is very syrupy, it should be tannified with an alcoholic solution of tannin, and then treated with a strong dose of pure gelatine.

This method is particularly useful with large quantities of liquid. When only small amounts have to be treated, they are filtered through paper, woolen strainers, or closed filters. In order to avoid too rapid

evaporation, the whole operation should be performed as rapidly as possible. Thus a perfectly clear liquid may be obtained.

These wines should remain undisturbed as much as possible, and be racked before sending away; for however clear they may be, it is seldom that they do not deposit a sediment, either on the bottom or on the walls of the casks. They age more rapidly in wood than in bottles.

IMITATION OF SWEET WINES WITH SIMILAR WINES.—The scarcity of certain foreign wines, their high price, the high custom duties which have to be paid on them, etc., have induced French wine makers and wine merchants already producing wines similar to those to adopt the processes of vinification which are used in foreign wine-growing districts.

In order to imitate sweet or dry wines, which are known in French commerce under the name of "*liqueur*" *wines*, it is necessary to have the various preparations and flavoring extracts on hand which are sometimes used in foreign wineries. These preparations are *saccharine matters, extracted* from the raisins or from the fortified musts; they are known in France under the name of *calabres*. They can be prepared with and without the application of heat.

Calabres Prepared Without the Application of Heat.—The must from very ripe grapes, having a specific gravity of 12 to 14 degrees, is fortified with enough alcohol to make the percentage 17. This is done as soon as the must is pressed; the alcohol stops the fermentation; if less alcohol should be added the must would begin to ferment. Other wine makers stop the fermentation of the must by means of sulphurous acid, and make preserved musts or unfermented wines. (Compare *Practical Method of Stopping the Fermentation of Musts.*)

Calabres Prepared With Application of Heat.—The making of these calabres consists in concentrating the musts by boiling. As soon as the must has left the press-room it is freed from the solid particles as much as possible (compare description of this operation in Book I of this work), and then concentrated in a boiler until it shows (being hot) from 20 to 25 degrees by the aerometer of Baumé; the foam should be skimmed off with care. After cooling, alcohol is added in the same proportions as in the previous case, or this concentrated must may be used for the making of unfermented wines.

Syrups are also made *from grape juice whose acid has not been neutralized* by boiling the must until it has from 30 to 32 degrees Baumé; but this kind of syrup is very colored and is only used for brandies and dry wines.

Syrup from Grape Juice whose Acid has been Neutralized.—This syrup is made in the following manner: The must is freed from its impurities by straining it through a basket, whose bottom is covered with several layers of straw. Then carbonate of calcium (powdered marble) or powdered chalk is stirred in. When the effervescence has stopped, that means when the tartaric, acetic, and malic acids are neutralized, the must is decanted and filtered from the sediment through blankets. There now remains nothing to be done but to clarify. For this purpose to twenty-two gallons of liquid two and four tenths pounds of blood or white of thirteen eggs are added. Blood is preferable. It should be well mixed; the pans which are used should be flat, and the whole operation should be conducted rapidly if it is desired to obtain colorless syrups. The foam should be carefully skimmed off and the liquid boiled down

until the Baumé spindle indicates 32 degrees. As soon as the boiling is done, the syrup should be allowed the least possible time to remain in contact with the air, for it very easily becomes colored. It should be kept in barrels completely filled. If the syrups are made in deep pans they assume a fawn-colored tinge.

For the same purpose, also, saccharine matters which are foreign to grape-juice—such as the *juice of the sugar cane, the syrup from white refined sugar, a mixture of candy-syrup with white wine, sugar-cane molasses, and honey*—are sometimes used. All of these substances should be mixed with alcohol or with old brandies.

FOR COLORING the deep-colored wines of the Roussillon, caramel, richly colored and aromatic alcoholic infusions or tinctures, of which we shall give the composition further on, are used.

In order to impart a taste of old wine, an *alcoholic infusion of the green peel of walnuts* is used; this infusion is made by pounding walnuts, which are allowed to turn brown in the air during twenty-four hours, on which is poured per each two and two tenths pounds, nine tenths of a quart of brandy (58 degrees); the infusion should be allowed to stand for three months before it is drawn off; the older the infusion is the better it fulfills its purpose. The same purpose can be attained by the alcoholic infusion of the roasted shells of bitter almonds.

In order to obtain this infusion, the shells of the almonds are crushed and roasted either in a coffee roaster or in a furnace. When their color has turned russet, they are thrown quite hot into a barrel with a large bunghole, and alcohol of 65 degrees is poured on them without allowing them to become cold. The proportions should be half a gallon of alcohol on three and three tenths pounds of shells. The mixture should be well stirred and allowed to stand at least a month before it is drawn off. Aging improves the infusion; this infusion can be replaced by one of roasted millet grass. The millet grass is roasted in the same way as the almond shells. Afterwards it is crushed, and while still hot, alcohol is poured on it and the mixture stirred.

BOUQUET.—We refer the reader, as far as the alcoholic infusions of iris, raspberries, etc., are concerned, to the chapter on *Artificial Bouquets*. We shall speak here of the aromas, whose mode of preparation we have not described.

Tincture of Calamint.—The tips of the stems and of the leaves of calamint are put in a barrel with large bunghole, or in any other vessel, and digested with alcohol of 85 degrees strength for a fortnight. The leaves and stems of the calamint should not be pressed together in the barrel. The roots of *Calamous aromaticus* fulfill the same purpose, and the extract is obtained in the same way, with the exception, however, that the roots are cut into small pieces.

Tincture of Cachou.—Pulverized cachou, five ounces; alcohol of 85 degrees, half a gallon. The mixture is allowed to stand for a fortnight before drawing off; care should be taken to stir this from time to time, in order to facilitate the solution of the cachou in the alcohol.

Tincture of Cloves.—Crushed cloves, one pound; alcohol of 85 degrees, three quarts. Same treatment as for the preparation of the cachou tincture, but in this case eight days of infusion are sufficient. These tinctures of cachou and of cloves are more aromatic if they are prepared

at a temperature of 100 degrees than if they are made at a lower temperature.

Elder Blossoms.—These blossoms are mixed with powdered sugar, which, after a fortnight or a month, becomes impregnated with their perfume. This perfume can be extracted by dissolving the sugar in a small quantity of water. Sometimes a small bag, which is filled with these blossoms, is suspended through the bunghole in the wine; but in this case, the flowers must remain in the wine longer than one month.

Essence of Tar.—Three quarts of brandy of 58 degrees, in which a pound of the best tar has been mixed, are slowly distilled in a sand bath, or in a water bath from a small retort. Not more than two quarts should be distilled; the distillate should be preserved in well corked bottles.

Infusion of Coffee with Tar.—Coffee is roasted in the usual way; in the hot infusion, one fourth of its bulk of liquid tar is poured; this tar should be prepared by dissolving good tar in double its weight of alcohol of 85 degrees.

The various preparations which we have described should be stored in places adapted to their nature, namely: The sweet and non-alcoholic liquids in cool cellars and in closed vessels; the alcoholic liquids in store-rooms or ordinary cellars.

PRACTICAL METHODS.—For the maker of "liqueur" wines, it is indispensable to have before his eyes *typical and genuine samples, new and old,* of the wines which he has to imitate, in order to enable him to ascertain: 1. Their composition; 2. Their alcoholic percentage; 3. Their specific gravity; the changes which time makes them undergo; their flavor; their bouquet, and their peculiar taste.

In order to imitate these types, the wine maker has to look among the "liqueur" wines for those which resemble most the former. In France, these wines are found only in Roussillon, in Languedoc, and in the Provence.

The best types among the white wines are the *Muscats*, which Rivesaltes produces; Frontignan and Lunel follow. The *Muscatelles* (or *Petits Muscats*) which are made in great quantities in the vineyards of the Héraults, in the Provence, in Roquemaure, in Ciotat, fulfill the same purpose, but they are very much inferior to the Muscats. These wines are used for imitating *Malaga*, *Malvoisie*, etc., by means of the various preparations which we have just enumerated. If the French Muscats date from a good year, if they are well made and strongly fortified, and if they have remained from eight to ten years in the cask, they can, without any other addition but of alcohol, bear comparison with the foreign Muscat wines, and are sometimes even superior to them. The artificial Muscat wines which are made from ordinary white wines by flavoring them with elderberries or elderflower extracts, do not give good results. They cannot be compared even with the Muscatelles.

Artificial Wines.—The advice which we have given in the preceding paragraphs, gives, if followed, excellent results; but these results come pretty high to the wine maker, particularly if the best varieties of wines which we have mentioned are chosen. Many people are hunting, not for *excellency*, but for *cheapness;* it is on this account that most of the firms of Cette, which make a specialty of the liqueur wines, have lost their reputation by *manufacturing* these wines at a very low price. This

came about in the following manner: The great firms which made a specialty of this branch of the wine industry, saw their existence threatened by rival merchants, who offered wines at wretchedly low prices. They were thereby compelled to produce merchandise which could be sold at the same price, or lower. However, the wines which are made in Cette, or in its neighborhood, should not be sold by reliable firms *as foreign wines.* Let it not be understood that all liqueur wines which come from abroad are of irreproachable quality. Then, too, there are frequently sold to us very ordinary wines, sweetened with poorly prepared musts, having a doughy taste, and arriving in a turbid condition. There are many among them which are colored artificially with molasses, caramel, etc. The consignors are allowed to clarify them by filtration, before they leave the warehouse; this is done by the foreman cooper, who has the wines in the vaults of the custom house in charge. Thus they may arrive in a clear condition.

But the ordinary wines from Cadiz, Madeira, etc., are far from being equal to the best brands of similar French wines. Aside from that, certain Spanish firms, in order to be able to compete with French wines, *manufacture* these wines from the ordinary country wines, with the help of syrups, *caramel* (which they use extensively, or, rather, misuse), and alcohol. In this way they produce a mixture of the kind we are going to speak of. Unfortunately, these artificial mixtures enjoy some prestige on account of arriving directly from the producing country. Nevertheless, sensible purchasers are not deceived, and pay only for the real value of the wines.

The *artificial "liqueur" wines*, or *imitations made out of dissimilar wines*, are concocted in the following manner: White or red wines, which are not acid, and which have no defects, are taken. Among the white wines those are chosen which have the highest alcohol-percentage, and which are the cheapest; among the red wines those are chosen which have a frank taste; if it is possible, they should be first fortified on the premises of the proprietor—but this only when the fermentation is over.

These wines have, then, on the average, from 18 to 20 per cent of alcohol. They should be kept in places which have a very high temperature; the barrels should be only partly filled and should be exposed to the sun; they age thus very rapidly, but in order that they should keep without undergoing detrimental changes, it is necessary that their alcohol-percentage should not go below 18.

M. Pasteur recommends keeping these wines in well corked and only half filled bottles; these bottles should be exposed to the sun under glass sheds. It is certain that under such conditions they would age more rapidly, for the temperature of the wine could be raised higher by this method than by the usual method of keeping in barrels; the oxygenation would also proceed more rapidly; but if the wine has less than 18 per cent it is liable to become "pricked."

If sweet wines have to be imitated, the artificial wines are sweetened with "calabres" prepared with the application of heat. If their specific gravity is required to be high, syrup made from raisins is added, in order to make their specific gravity equal in saccharine to the typical wine. Then the bouquet is imparted to them by intelligently using the tinctures and preparations which have been described above. Color is imparted to them with the help of the infusions we have already mentioned. To imitate Muscat wines elder blossoms are used; but

neither of the preparations made by the use of these flowers can replace the ordinary *Muscatelles.*

Still, notwithstanding the inferiority of the wines which are manufactured from wine dissimilar to that to be imitated, there are authors, who call themselves œnologists, who profess that, for making "liqueur" wines, it is not absolutely essential to use natural wines. And this method is what several firms in Paris are practicing—making *entirely artificial wines*, in the composition of which not a drop of grape-juice enters. In this case the wine is replaced by weak brandy, which has, on the average, 20 per cent, and which has been diluted with the same quantity of tartar solution. This latter is water, in which there have been dissolved either seventy-five grains of cream of tartar (while hot), or thirty grains of tartaric acid, dissolved cold.

To these weak brandies some of the preparations which we have enumerated are added; they are then sweetened with cane sugar, glucose syrup, or with equally adulterated grape syrups.

These preparations do not contain anything unwholesome. They are liquids composed merely of water, alcohol, saccharine matters, tartaric acid, and flavoring extracts, which, with the help of a label and much credulity on the part of consumers, pass for the wines the general and unadulterated types of which the majority of consumers have never tasted.

VERMOUT.—In order to make a good vermout a white wine should be taken, possessing as frank a taste as possible. With this wine an infusion is made, according to the rules we are going to give, of various aromatic plants, of which wormwood is the most important. The best vermouts are made in Italy.

In the trade several varieties of vermout are distinguished: 1. The quinquina vermouts, after the Italian fashion, which have tonic, aperient, and vermifuge qualities. 2. The dry vermouts, called Madeira vermouts. 3. The mellow, aromatic vermouts. 4. The ordinary vermouts.

Vermout shows many peculiarities, according as the wine used in its manufacture is new or old, dry or mellow; wine with an agreeable flavor, or with an earthy taste. The quantity and variety of the plants which were infused, the time of infusing, the methods of preparation, etc., have also an influence on the taste of the vermout. Aside from these there are found varieties in the taste even of the vermout of each individual manufacturer.

In order to make a good vermout it is necessary:

1. That the white wines which are destined for this purpose should be old (at least one year), that they should have a frank taste, without harshness or tartness. White wines which continue sweet after the fermentation is over, should be preferred to dry wines for the preparation of mellow vermouts. If the wine be dry it would be necessary to add syrup.

2. These wines should be clear and their alcohol-percentage should be from 18 to 20 after fortifying. This condition is indispensable to the vermouts distined for export and for consumption in tropical countries.

3. That the plants should be carefully cleaned and the hard substances crushed and powdered.

4. The period of the infusion should be attentively watched—the higher the temperature the shorter the time required.

5. The wine after infusion should be racked, clarified, and again racked, and if its condition is not perfectly bright it should be clarified a second time or filtered and poured back into the cask. It should then be allowed to rest in a cellar possessing an even temperature.

Before shipping, these wines should remain in the cask at least a month. Newly made, they have a taste of weeds, which disappears with time. The vermouts which are six months or a year old are far superior to the younger ones.

Firms which make a specialty of vermouts should have certain casks for containing vermouts which are clarified and ready. The oldest should be sent off first, and in proportion as the casks become empty new vermout is made in order to give it time to age. After complete clearing and allowing to remain a long time in the casks, these wines improve, the combination of the aromas becomes more intimate, and they continue clear during the voyage. On the other hand, if they are sent off soon after making, even though they be perfectly clear, they become turbid and deposit a sediment during long voyages.

The recipes which follow are calculated for two hundred-gallon lots:

QUINQUINA VERMOUT.

White wine, of frank taste, old, and clarified, 18 per cent alcohol	200 gallons.
Wormwood	2 pounds.
Rosemary	2 pounds.
Red Peruvian bark (quinquina), or yellow, crushed and previously infused with one quart of alcohol of 86 degrees	4 pounds.
Rhubarb	$\frac{1}{3}$ pound.
Angelica root	1 pound.
Holy thistle	2 pounds.
Cowslip	2 pounds.
Veronica	2 pounds.
Alcohol infusion of Seville oranges	3 quarts.
Alcoholic tincture of iris	$\frac{7}{10}$ quart.

The various plants, after a thorough cleaning and crushing, should be put into the wine. The infusion should be poured from one vessel into another, stirred, and allowed to stand thus from three to six days, according to the temperature; the mixture should be stirred several times every day.

The white wine chosen for this purpose is dry or mellow, according to the vermout desired. Dry vermouts require dry wines, and sweet vermouts mellow ones. If it is not possible to obtain a sweet wine, the vermout should be sweetened after infusion, by adding forty pounds of refined sugar to each two hundred gallons, and two gallons of alcohol of 85 degrees to the same. These quantities may be increased or diminished, if desired. The sugar should be previously crushed and dissolved in the wine, being frequently stirred to assist dissolution. The vermouts which are made according to this recipe, are very aromatic and good tonics. Consumers sometimes find them too bitter and too astringent, in which case it is necessary to age them before selling.

Astringent and Tonic Vermout made with Imitation Madeira.—We have made excellent vermouts of this kind with the following plants:

Assorted wormwood	2 pounds.
Costinary	1 pound.
Génépides alpes	1 pound.
Origanum vulgaris	1 pound.
Cascarilla bark	1 pound.
Assorted tea	1 pound.
Angelica root	1 pound.

Crushed coriander	4 pounds.
Cinnamon	2 pounds.
Calamint	2 pounds.
Gentian	1 pound.
Rasped nutmeg	½ pound.
Tincture of iris	$\frac{7}{10}$ quart.
Fresh slices of Seville oranges	5 pounds.
Galanga	1 pound.
Tormentil	$1\frac{3}{16}$ pounds.
Cloves	1 pound.

Two hundred gallons of imitated Madeira wine.

MUSCAT VERMOUT.

Assorted wormwood	2 pounds.
Elder blossoms which have been assorted and mixed a week before with eight pounds of powdered sugar	4 pounds.
Crushed coriander	9 pounds.
Nutmegs	1 pound.
Cinnamon	2 pounds.
Alcoholic tincture of iris	$\frac{7}{10}$ quart.
Sweet orange peels, well pulverized	6 pounds.
Angelica root	1 pound.
Galanga	1 pound.
Germanda	2 pounds.
Cloves	1 pound.
Quassia	½ pound.
True acore	2 pounds.
Lesser centaury	2 pounds.
Elecampane	2 pounds.
Holy thistle	2 pounds.

For this variety of vermouts, sweet wines are preferred. The Muscat wines are suitable for this purpose; in case they cannot be had, syrup should be added—preference being given to neutralized raisin syrup. The latter should be as little colored as possible; raw cane sugar can be taken, or even refined white sugar.

ITALIAN VERMOUT.

Wine	220 gallons.
Wormwood	2.6 pounds.
Fresh oranges, cut in very thin slices	50 oranges.
Holy thistle	2.6 pounds.
Calamint	2.2 pounds.
Angelica root	0.4 pounds.
Cinnamon	2.2 pounds.
Nutmegs	1.4 pounds.
Gentian	1.3 pounds.
Germanda	2.2 pounds.
Lesser centaury	2.2 pounds.
Elecampane	2.2 pounds.

Some manufacturers do not make use of the last three plants.

This vermout, though of good quality, is inferior to those which are made according to the former prescriptions.

Some manufacturers have a practice of coloring the vermouts with caramel. Others, instead of infusing the plants in white wine, infuse them in alcohol, and then pour the alcoholic infusions into the white wines. Aside from the objection that the astringent principals are not dissolved, the chlorophyl of these plants gives to these infusions a dark green color. Vermouts which are made in this way are, too, more liable to deposit sediments. First class vermouts should have the *natural color of white wine*, viz.: light amber.

Treatment of the Vermouts.—Vermouts should be treated exactly in the same manner as the liqueur wines, of which they are but a variety; if thought to be wanting in alcohol, it should be ascertained if the percentage of this ingredient is higher than 16. In order to keep well, the dry vermouts should be treated as ordinary wines; the sweet ones, if their alcohol-percentage is below 16, are liable to ferment again, particularly in warm countries. It is therefore necessary to fortify them so that they should contain from 18 to 20, or at least 17 per cent of alcohol. If they are too bitter, they should be blended with aromatic vermouts, which are made without using bitter substances, or they should be diluted with good white wines with frank taste, having at least 17 per cent of alcohol, and to which two pounds of white sugar per gallon have been added. In large establishments the astringent and aromatic substances remaining in the plants after the first infusion are extracted by a second infusion or by distillation.

STATEMENT OF THE IMPORT DUTIES

OF ALL THE PRINCIPAL COUNTRIES TO WHICH CALIFORNIA WINES, BRANDIES, AND RAISINS ARE OR MAY BE EXPORTED.

Prepared by WINFIELD SCOTT, Secretary of the Commission.

Demands are frequently made at the office of the Board of State Viticultural Commissioners for a reliable statement of the tariffs of the principal foreign countries to which the viticultural products of California are at present, or may be in the future, exported, whether from San Francisco or from Atlantic ports. These statistics have been collected from the Consuls of the various countries, resident in San Francisco, and are therefore official and correct.

WINFIELD SCOTT,
Secretary.

ENGLAND AND HER COLONIES.

ENGLAND.

Wine, in casks, not over 30 degrees proof	1 shilling per gallon.
Wine, in casks, between 30 and 42 degrees proof	2 shillings 6 pence per gallon.
Wine, sparkling, under 30 degrees proof	1 shilling per gallon.
Wine, sparkling, between 30 and 42 degrees proof	2 shillings 6 pence per gallon.
All wines over 42 degrees proof	3 pence additional for each degree.
If sparkling and in bottles, if worth not over 15 shillings	1 shilling per gallon additional.
If over 15 shillings	2 shillings 6 pence per gallon additional.
Spirits	10 shillings 4 pence per proof gallon.
Spirits, not tested as in cordials	14 shillings per gallon.
Spirits, if bottled and in bond	3 pence per dozen.
Raisins	7 shillings per hundredweight.

CANADA.

Wine, up to 26 per cent alcohol	25 cents per gallon.
Wine, each degree between 26 and 40 per cent	3 cents per gallon.
Wine, sparkling	$3 per dozen.
Brandy	$2 per imperial gallon.

NEWFOUNDLAND.

Claret	40 cents per gallon.
Spanish reds and Italian	35 cents per gallon.
Malaga	35 cents per gallon.
Port and Madeira	$1 65 per gallon.
Hock and Burgundy	85 cents per gallon.
Champagne	$3 per gallon.
All other	12½ per cent and 90 cents per gallon.
Brandy	$2 40 per gallon.

QUEENSLAND.

Wine, sparkling	10 shillings per gallon.
Wine, all other	6 shillings per gallon.
Brandy	12 shillings per gallon.
Brandy, coloring, over 35 per cent alcohol	12 shillings per gallon.
Raisins	2 pence per pound.

TASMANIA.

Wine, sparkling	10 shillings per gallon.
Wine, all other, in wood	6 shillings per gallon.
Wine, all other, in bottles	8 shillings per gallon.
Brandy	15 shillings per gallon.
Brandy, coloring, over 35 per cent alcohol	15 shillings per gallon.

NEW ZEALAND.

Wine, sparkling	9 shillings per gallon.
Wine, all other, except Australian, containing less than 40 per cent proof spirits	6 shillings per gallon.
Wine, Australian, containing not more than 35 per cent proof spirits	5 shillings per gallon.
Spirits in bottles, jars, etc.	16 shillings per gallon.
Spirits in bulk, jars, etc.	15 shillings per gallon.
Raisins and dried fruit	2 pence per pound.

NOTE.—There is a discrimination of 1 shilling per gallon in favor of Australian wine. The latest advices indicate that South Australian wine will probably be admitted free, the latter colony agreeing to admit New Zealand oats free.

NEW SOUTH WALES.

Wine, sparkling	10 shillings per gallon.
Wine, all other	5 shillings per gallon.
Brandy	12 shillings per gallon.
Brandy, coloring, containing over 35 per cent alcohol	14 shillings per gallon.
Raisins	2 pence per pound.

VICTORIA.

Wine, sparkling	8 shillings per gallon.
Wine, all other	6 shillings per gallon.
Brandy	12 shillings per gallon.
Brandy, coloring, containing over 35 per cent alcohol	15 shillings per gallon.
Raisins	2 pence per pound.

SOUTH AUSTRALIA.

Wine, sparkling	10 shillings per gallon.
Wine, all other, up to 35 per cent proof	6 shillings per gallon.
Brandy	14 shillings per gallon.
Brandy, coloring, containing over 35 per cent alcohol	14 shillings per gallon.
Raisins	2 pence per pound.

CEYLON.

Claret, bottled	1 rupee and 25 cents per gallon.
Claret, bulk	50 cents per gallon.
Sparkling wines	50 cents per gallon.
All other wines, bottled	1 rupee and 50 cents per gallon.
All other wines, bulk	1 rupee per gallon.
Spirits	4 rupees per proof gallon, and 50 cents for every 10 degrees over proof.

FIJI ISLANDS.

Claret and Australian wines, bottled or bulk	2 shillings per gallon.
All other still wines	4 shillings per gallon.
Sparkling wines	6 shillings per gallon.
All spirits	14 shillings per gallon.

NEW GUINEA.

Spirits	12 shillings per gallon.

JAMAICA.

All wines	2 shillings 6 pence per gallon.
All spirits	10 shillings per gallon.

TRINIDAD.

Wines, sparkling	4 shillings per gallon.
Wines, all other, bottled, under 35 per cent alcohol	2 shillings 6 pence per gallon.
For each degree over 35 per cent	3 pence.
Wines, all other, in wood, up to 22 per cent	8 pence per gallon.
Wines, all other, in wood, up to 32 per cent	1 shilling per gallon.
Wines, all other, in wood, up to 42 per cent	2 shillings 6 pence per gallon.
For each degree above 42 per cent	3 pence.
Brandy	9 shillings per gallon.

BERMUDA.

Wine	20 per cent ad valorem.
Alcohol and all distilled liquors	4 shillings per gallon.

BRITISH GUIANA.

Wine, not over 26 per cent proof and not over $2 per gallon	50 cents per gallon.
Wine, bottled	$1 per dozen pints.
Wine, all other	80 cents per gallon.
All spirituous liquors	$2 50 per proof gallon.

CAPE COLONY.

Wine	6 shillings per imperial gallon.
Distilled spirits	2 shillings per imperial gallon.

OTHER COUNTRIES.

FRANCE.

Wine, from European countries	4 fr. 50 c. per hectoliter.
Wine, from all other countries	4 fr. 50 c. per hectoliter.
Alcohol and distilled liquors of all kinds	30 fr. per hectoliter.
Liqueurs	30 fr. per hectoliter.

GERMANY.

Wine, in casks, leather bottles or jugs of at least 50 kilogrammes gross weight	24 marks per 100 kilogrammes.
Wine, in small bottles or small leather bottles or jugs	If sparkling, 80 marks per 100 kilogrammes; if still, 48 marks per 100 kilogrammes.

Fruit wines and cider not included.

Dried grapes	24 marks per 100 kilogrammes.
Fermented grapes	Same as wine.
Fruit brandies	180 marks per 100 kilogrammes.
Wash and singlings	Free.

ITALY.

Wine in casks	15 francs per 100 hectoliters.
Wine in bottles	30 francs per 100 hectoliters.
Brandy and other spirits in casks	25 francs per 100 hectoliters of pure alcohol.
If less than 80 proof	20 francs per 100 hectoliters.

RUSSIA.

Arrack, rum, brandy (French), and prune brandy	11 rubles per pud, brutto.
Grain spirits in bottles, liquors, kirchwasser, gin, whisky, and all spirits flavored with various fruits, also arrack, rum, French brandy, and prune brandy	75 copecs per bottle.

Remarks.—All grain spirits of all kinds in barrel and other large packages are prohibited for importation.

Wine of grapes—

All imported in wood	3 rubles 50 copecs per pud, brutto.
Not mousseux	40 copecs per bottle.
All kinds mousseux	1 ruble 25 copecs per bottle.
Raisins	1 ruble 80 copecs per pud.

All duties payable in gold.

SPAIN.

Wine, sparkling	150 pesetas per hectoliter.
Wine, all other	50 pesetas per hectoliter.
Brandy	20 pesetas per hectoliter.
Other distilled liquors	1 peseta per liter.
All preserved and dried fruits	1 peseta per kilogramme.

DENMARK.

Wine and fruit juice, unfortified, in bottles	13.44 cents per Pot.*
Same in barrels	2.73 cents per pound.
Grape wine, in casks	22 per cent ad valorem.
Grape wine, in stone jars	45 per cent ad valorem.
Liquors which cannot be graded	13.44 cents per Pot.
Same, 8 degrees strength or under	50.4 cents per eight Pots.
Same, for each ¼ degree over 8 degrees	.1 cent per eight Pots.

SWEDEN.

Wines, all kinds, not exceeding 21 per cent of alcohol	15 ore per liter.
Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in casks)	30 ore per kilogramme.

*1.7 Pots equal 1 gallon.

Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in other packages)	65 ore per liter.
Wines, all kinds, over 25 per cent of alcohol	1 krone 50 ore per liter.
Brandy and spirits in casks and made from grapes in any other country than France	75 ore per liter of 50 per cent alcohol at 15 degrees Celcius.
Same in other packages (regardless of the percentage of alcohol)	1 krone 11 ore per kilogramme.
Raisins	14 ore per kilogramme.

No allowance for tare.

NORWAY.

Wines, not exceeding 21 per cent alcohol, in casks (16 per cent for tare)	11½ ore per kilogramme.
Wines, not exceeding 21 per cent alcohol, in bottles	11½ ore per liter.
Wines, between 21 per cent and 25 per cent alcohol, in casks (16 per cent for tare)	36 ore per kilogramme.
Wines, between 21 per cent and 25 per cent alcohol, in bottles	36 ore per liter.
Wines, over 25 per cent alcohol	Same as brandy 100 proof.
Brandy, in bottles	1 krone 60 ore per liter.
Brandy, in other packages, 100 proof (16 per cent tare for casks)	1 krone 71 ore per liter.
Raisins (20 per cent tare on cases)	12 ore per kilogramme.

BELGIUM.

Alcoholic liquors (distilled) used as beverage, up to 50 degrees strength; Gay Lussac at 15 degrees Centigrade, in casks	100 francs per hectoliter.
Same, each degree in excess of 50 degrees	2 francs per hectoliter.
Same, in bottles, regardless of strength	200 francs per hectoliter.
Wines (subject to Internal Revenue tax of 23 francs per hectoliter)	Free.
Wines, over 18 per cent alcohol	Excess at the rate for alcoholic liquors.
Raisins	25 francs per 100 kilogrammes.
Dried grapes	Free.

SWITZERLAND.

Wine in casks, flasks, or jars	3 francs and 50 rupins per 100 kilogrammes.
Cognac and alcohol, in casks—for each degree of alcohol up to 100, as measured by Gay Lussac's alcoholometer	20 rupins per 100 kilogrammes.

HAWAII.

Alcohol and other spirits	$10 per gallon.
Alcohol for medicinal uses	$3 per gallon.
Brandy, etc. (between 30 and 55 per cent of alcohol and above 55 per cent pro rata)	$3 per gallon.
Wines (sparkling), quarts	$3 per dozen.
Wines (sparkling), pints	$3 per two dozen.
Wines (dry), quarts	40 cents per dozen.
Wines (dry), pints	40 cents per two dozen.
Wines (fortified), between 21 and 30 per cent alcohol	$2 per gallon.

MEXICO.

Wine, red or white, in glass, no allowance for leakage or breakage	20 cents per kilogramme (net weight).
Same in wood	12 cents per kilogramme (net weight).
All other spirituous liquors under same conditions	25 cents per kilogramme (net weight).
Raisins	10 cents per kilogramme (net weight).

SALVADOR.

Vinous liquors	5 cents per kilogramme (gross).
Distilled liquors	30 cents per kilogramme (gross).
Raisins	10 cents per kilogramme (gross).

NICARAGUA.

Still wines	3 cents per pound (gross).
Sparkling wines	5 cents per pound (gross).
Distilled liquors (between 12 and 25 degrees alcohol)	40 cents per pound (gross).
For every degree above 25	3 cents per pound (gross).

COSTA RICA.

Wines in bottles	3 cents per kilogramme (gross).
Wines in bulk	5 cents per kilogramme (gross).
Liquors (whose introduction is allowed in barrels)	80 cents per kilogramme (gross).
Liquors (introduced in other packages)	60 cents per kilogramme (gross).
Cognac and all brandies (in barrels or demijohns)	80 cents per kilogramme (gross).
Cognac and all brandies (in other packages)	60 cents per kilogramme (gross).
All dried fruits, including raisins	13 cents per kilogramme (gross).

GUATEMALA.

Red wines (in whatever packages)	25 cents per bottle.
White wines (in whatever packages)	28 cents per bottle.
Sherry (in whatever packages)	28 cents per bottle.
All others	35 cents per bottle.
Brandy and all spirits up to 20 degrees Baumé	63 cents per bottle.
All dried fruits	7 cents per pound.

HONDURAS.

Wines, in cask or bottle	2 centavos per pound.
Brandies, in cask or bottle	30 centavos per pound.
All dried fruits	8 centavos per pound.

ECUADOR.

Wine	10 centavos per kilogramme (gross).
Brandy	Cane brandy prohibited.
Other brandy	25 centavos per kilogramme (gross).
Raisins	5 centavos per kilogramme (gross).

COLOMBIA.

Claret, in barrels or demijohns	2½ cents per kilogramme.
White wine, in barrels or demijohns	2½ cents per kilogramme.
All other wine	40 cents per kilogramme.
Brandy and distilled liquors	40 cents per kilogramme.
Raisins	20 cents per kilogramme.

CHILI.

Red wines, in bottles	$3 per dozen.
Red wines, in wood	32 cents per liter.
White wines, in bottles	$2 25 per dozen.
White wines, in wood	25 cents per liter.
Wine spirits	50 cents per liter.
Cognac	$4 per dozen.
Cognac	42 cents per liter.

VENEZUELA.

Wines for medicinal purposes	1.25 bolivares* per kilogramme.
Bordeaux and Spanish reds	.25 bolivares per kilogramme.
All others	.75 bolivares per kilogramme.
Sweet liquors (not rectified)	1.25 bolivares per kilogramme.

* One bolivar equals 19.3 cents.

INDEX.

ANNUAL REPORT

OF THE

Board of State Viticultural Commissioners

FOR 1891-92.

WITH APPENDICES A, B, C, D, AND E (APPENDIX A BOUND SEPARATELY).

SACRAMENTO:
STATE OFFICE, : : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1892.

Anal Appendix A.

ANNUAL REPORT

OF THE

Board of State Viticultural Commissioners

FOR 1891-92.

WITH APPENDICES A, B, C, D, AND E (APPENDIX A BOUND SEPARATELY).

SACRAMENTO:
STATE OFFICE, : : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1892.

OFFICERS AND MEMBERS OF THE BOARD.

GEORGE WEST, President .... Stockton.
Commissioner for the San Joaquin District.

CHARLES BUNDSCHU, Vice-President .... San Francisco.
Commissioner for the San Francisco District.

ALLEN TOWLE, Treasurer .... Towles.
Commissioner for the El Dorado District.

J. DeBARTH SHORB .... San Gabriel.
Commissioner for the State at Large.

JOHN T. DOYLE .... San Francisco.
Commissioner for the State at Large.

ISAAC DeTURK .... Santa Rosa.
Commissioner for the Sonoma District.

E. C. PRIBER .... Napa.
Commissioner for the Napa District.

R. D. STEPHENS .... Sacramento.
Commissioner for the Sacramento District.

E. C. BICHOWSKY .... San Gabriel.
Commissioner for the Los Angeles District.

WINFIELD SCOTT, Secretary .... San Francisco.
CLARENCE J. WETMORE, Chief Executive Viticultural and Health Officer .... Livermore and San Francisco.

Office of the Board:
317 PINE STREET, SAN FRANCISCO.

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REPORT OF GEORGE WEST,

President of the Board of State Viticultural Commissioners, 1892-93.

STOCKTON, CAL., August 1, 1892.

To his Excellency H. H. MARKHAM, *Governor of the State of California:*

SIR: I herewith transmit the financial report of the Board of State Viticultural Commissioners, showing the receipts and disbursements of the Board during the forty-second and forty-third fiscal years; also the report of Hon. J. DeBarth Shorb, as President of the Board for the forty-third year.

You will find following the financial statement, furnished by Clarence J. Wetmore.

Respectfully submitted.

GEORGE WEST,
President of the Board of State Viticultural Commissioners.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following report of receipts and disbursements for the forty-second fiscal year, ending June 30, 1891, as taken from the books in this office:

RECEIPTS.

Amount appropriated by the Legislature for the forty-first and forty-second fiscal years, from July 1, 1889, to July 1, 1891	$35,000 00	
Amount expended forty-first fiscal year as per report rendered	17,479 77	
Amount available for forty-second fiscal year		$17,520 23

DISBURSEMENTS.

Salaries	$3,000 00	
Office expenses, including salaries of employés, and rent	10,761 50	
Experimental work	1,021 60	
Statistics	2,050 00	
Traveling expenses of Commissioners	39 20	
Investigating foreign markets	200 00	
Library	102 90	
State Analyst	117 00	
Distributing information	75 00	
Reports	71 70	
Insurance	61 25	
		$17,500 15
Balance unexpended		$20 08

The receipts and disbursements for the forty-third fiscal year were as follows:

RECEIPTS.

Amount appropriated by Legislature for the forty-third and forty-fourth fiscal years, from July 1, 1891, to July 1, 1893	$30,000 00

DISBURSEMENTS.

Salaries	$3,000 00	
Office expenses, including salaries of employés, rent, etc.	7,363 15	
Traveling expenses Chief Executive Officer	386 40	
Library	172 35	
State Analyst	700 00	
Experimental work	141 60	
Reports	638 50	
Investigations	100 00	
Convention	176 40	
Traveling expenses of Commissioners	75 20	
		$12,753 60
Amount available for the forty-fourth fiscal year		$17,246 40

C. J. WETMORE,
Chief Executive Officer.

REPORT OF J. DE BARTH SHORB,

President of the Board of State Viticultural Commissioners, 1891-92.

To his Excellency H. H. MARKHAM, *Governor of the State of California:*

SIR: I herewith submit to you my annual report as President of the Board of State Viticultural Commissioners for the year ending June 30, 1892, together with the reports of District Commissioners and others, bringing the work of the Commissioners to the above date, when I retired from the presidency of the Board.

There have been a few changes in the personnel of the Board during the past year. In December, 1891, Hon. George G. Blanchard, the Commissioner for the El Dorado District, died, after a very short illness. Judge Blanchard had been associated with the Board from its inception, and his services with us, as in all walks of life, were distinguished and honorable. The seat made vacant by his death was not occupied until April, when Mr. Allen Towle, of Towles, was appointed to the Commission.

The term of Hon. L. J. Rose, as Commissioner for the Los Angeles District, expired by limitation in April. Mr. Rose is no longer actively engaged in viticulture, and requested that the position be given to one who was, and who could give more attention to the duties of the office. His place was filled by the appointment of Mr. E. C. Bichowsky, of L. J. Rose & Co. (limited), one of the young and active viticulturists of the Los Angeles District, and in every way a desirable addition to the Board.

The terms of George West, as Commissioner for the San Joaquin District, and John T. Doyle, as Commissioner for the State at Large, expired in April. These gentlemen, who have had a long and honorable service in the Board, were reappointed.

There have been several changes in the officers of the Board. At the annual meeting in June, 1891, I was elected President, in place of Mr. I. DeTurk, who declined reëlection, and Mr. George West was elected Vice-President, in my place. At the annual meeting in June, 1892, I declined a reëlection, on account of ill-health, and Mr. George West was chosen to succeed me, Mr. Charles Bundschu being elected Vice-President. At the same time Mr. John T. Doyle declined reëlection as Treasurer, and Mr. Allen Towle was elected in his stead.

The office of the Secretary has not been changed, Mr. Winfield Scott still holding the position. Mr. Charles A. Wetmore declined reëlection as Chief Executive Officer at the June meeting in 1891, and Mr. Clarence J. Wetmore was chosen in his place.

THE VITICULTURAL SITUATION.

The wine industry is in a most peculiar situation, and it would seem that there must be some improvement in the near future. All of the vineyards set out in that great planting era of 1880 to 1885 are in

bearing, and there are practically no new vineyards to come into bearing. This means that the annual yield of wine and brandy in the State cannot be materially increased for at least five years—that is, until new vineyards can be planted and brought into bearing. I do not think that the annual yield for the next five years will exceed 18,000,000 gallons of wine and 1,250,000 gallons of brandy.

To consume this we have a present Eastern and foreign demand for 12,000,000 gallons of wine and 800,000 gallons of brandy, and a home consumption of wine of 6,000,000 to 8,000,000 gallons, and of brandy about 300,000 gallons.

This, then, is the situation: Our markets for wine and brandy are requiring steadily increasing quantities, and are in a fair condition. We have no means of increasing our production within a reasonably short time. How the reaction for the better can be long delayed is difficult to conceive.

The raisin business is not in a satisfactory condition. Several years of unexampled prosperity on the part of those who owned bearing Muscat vineyards seems to have turned the heads of intending investors, and for three or four years past the planting of raisin-grape vineyards ran riot, particularly in the San Joaquin Valley. In February, 1891, Mr. George West, the Commissioner for the San Joaquin District, published a report on the raisin industry, in which he deprecated further planting, and showed where the business was drifting to. His report at that time was received with bitter denunciations, but time, I think, has demonstrated the wisdom of what he said. Many thousands of poor people were deterred from investing their all in the industry, and were saved from what appeared certain loss. It is estimated that his report prevented the planting of at least 20,000 acres of Muscats in the winter of 1891–92. His report, to which I invite special attention, is printed elsewhere.

The raisin producers, already threatened with overproduction, though tens of thousands of acres of Muscats, etc., are not in bearing, are holding mass meetings to devise ways and means to keep up prices. What the outcome will be when all the young vineyards come into bearing, time only can tell.

The table grape business is in a very satisfactory condition, and no complaints are to be heard from the leading shippers.

WORK OF THE COMMISSION.

Much of the work of the Commission in the past two years has been directed towards finding a market for California wines and brandies. To this end the Viticultural Exhibit and Café has been maintained with considerable success. The results of this branch of the Commissioners' work cannot be judged by the amount of wine actually sold, but by the effect on the course of trade in California, and on Eastern buyers who have visited the place.

I am free to state that in San Francisco the objects of the café have been attained. A few years ago when the café was first opened, there were no hotels or restaurants in San Francisco and comparatively few private houses, in which recognized brands of California wine or brandy could be had. The leading grocers would not recognize or sell brands, nor could any reasonable inducement be held out to them to do so. As

for the hotels and restaurants, all that any of them would do was to bunch all red wines as "California Zinfandel," and all white wines as "California White Wine."

Now, however, matters have changed. Through the influence of the café, brands are everywhere recognized. It was a difficult matter to bring the large grocers, the hotels, and particularly the French restaurateurs to this, but they have been compelled by the demands of their customers to recognize brands. Following this, private brands have worked their way largely into families.

I am of the opinion that the establishment of similar cafés and exhibits under State control in Chicago and New York would be of immense value to the viticultural industry. In both places there is large sale for California wines and brandies, but the makers and shippers are greatly retarded by the evil of foreign labels and high prices on superior and cheap domestic products. These large markets are in exactly the same condition as was the San Francisco market five years ago, and I believe that similar methods would bring about similar and equally desirable results. The manner of the management of the café was well and ably described by my predecessor, I. DeTurk, and it is needless for me to go into details on this point.

The operations of the café and disposition of the wines sent to the rooms by exhibitors in the two years ending June 30, 1892, are shown by the following statement:

REPORT OF CAFÉ.

From July 1, 1890, to June 30, 1892.

RECEIPTS.		
Bottles on hand July 1, 1890	4,992	
Bottles received July 1 to December 31	8,694	
Bottles received 12 months, 1891	15,570	
Bottles received 6 months to June 30, 1892	5,454	
		34,710
DISPOSITION.		
Bottles sold	16,700	
Bottles returned	6,820	
Bottles broken, bad order, samples	1,278	
Bottles used by owner	2,187	
Bottles placed on exhibit	213	
Bottles on hand June 30, 1892	7,512	
		34,710
FINANCIAL.		
Amount cash received		$8,641 50
Amount to corkage and to café	$1,713 30	
Amount to reserve fund	480 85	
Amount paid exhibitors	6,447 35	
		$8,641 50
Sales of empty bottles, cases, etc.—amount placed in reserve fund		$302 55

The establishment of cafés in New York and Chicago, I need not say, would be warmly welcomed by California producers. It is true there has been one in Chicago which proved a disappointment, but that does not affect the soundness of the idea. This café was supported wholly by private enterprise, and mismanagement was responsible for its failure. In competent hands such cafés should prove successful and be a great benefit to the industry.

PUBLICATIONS AND INVESTIGATIONS.

It must not be supposed, however, that the sole work of the Commission has been to maintain the café. The outside investigations have been of equal if not greater importance.

The investigation into the cause and remedy for the so-called Anaheim disease has ceased. I am of the opinion that this disease has about run its course in Southern California, after having destroyed, in round numbers, from fifteen thousand to eighteen thousand acres of vines. Its origin, its nature, and its cure are still unknown and as mysterious as the day the disease was first noticed. Some of the vineyardists of Orange County and elsewhere, whose vineyards were wiped out by the malady, have begun planting experimental plots to ascertain whether the conditions are still favorable for its development. On this matter I have prepared a special report, being one of the "Special Committee on Anaheim Disease" of the Board.

Under the direction of Chief Executive Officer C. J. Wetmore, Mr. William C. Spencer has conducted a series of experiments to test the effect of alternating electrical currents on wine and brandy. The samples treated and untreated are now in the experimental cellar of the Commission, for examination by those interested.

During the past two years considerable attention has been given to the production of cream of tartar in California. One extensive factory has been located at Napa, for the utilization of pomace, under the California Cream of Tartar Co., and has met with fair success. Other gentlemen have signified their intention of engaging in this new industry, notably Mr. George West, of Stockton, Mr. John H. Wheeler, of St. Helena, and Capt. J. Chamon de St. Hubert, of Fresno. In order to obtain the latest and best information on the manufacture of this important viticultural bye product, this Commission has had Prof. W. B. Rising, of Berkeley, under engagement for many months investigating the subject. His two reports on the matter are published in this report. We have also had translated a work entitled "The Utilization of Wine Residues," by Antonio dal Piaz, which treats of the same subject, among others. This translation will be found as an appendix to this report.

The Directory of the Grape Growers and Wine Makers of California and of the Eastern States, undertaken some time ago, has been completed and published. It is by far the most complete and valuable book on the subject yet issued. It shows that in 1890 there were 168,366 acres of vines in California, of which 122,168½ acres were in bearing and 46,197½ acres not bearing. Of the total acreage, 90,228 acres were in wine grapes, 9,300½ in table grapes, and 68,837½ acres in raisin grapes. This represents to-day practically all the vineyards in the State, except the raisin-grape vineyards. I should estimate that there are to-day about 100,000 acres of Muscat, Seedless Sultana, and Malaga vines in California, and that the total acreage in vines in the State is about 200,000. Our directory is practically correct to-day as far as concerns the acreage of wine and table grapes, but I would recommend that after the planting of this season is over another census be taken in the principal raisin-grape-producing counties, in order to ascertain where the raisin business is drifting.

The Board has also compiled and published a most complete and valuable work on the distillation of brandy, supplementing it with a trans-

lation of Antonio dal Piaz's treatise on cognac manufacture. This was published as Appendix A to this annual report, and is bound separately. It has proved one of the most valued and appreciated books ever issued by this Commission. The demand for copies of this work has been large and steady, and already there is a shortage of copies.

Immediately after the passage of the Sweet Wine bill, Mr. Frank A. West went to Washington to confer with the Commissioner of Internal Revenue in regard to the regulations to govern the administration of the law. While he was in Washington the Board sent him to the principal wine-producing sections of New York and northern Ohio in the interest of the sale of high-proof brandy and concentrated must to Eastern sweet-wine makers. Mr. West has submitted a report on this question, which will be read with interest.

Mr. Clarence J. Wetmore, the Chief Executive Officer, is now engaged in writing a treatise on the wine-making and grape-crushing appliances peculiar to California, with appropriate illustrations, which will soon be ready for publication.

Mr. Winfield Scott, the Secretary, is at present engaged in translating M. Valery Mayet's work, "*Les Insectes de la Vigne*," a French work of remarkable thoroughness and value, on the insect pests which attack the vine, and the remedies therefor. This book, too, will be ready for publication in a short time.

VITICULTURAL CONVENTION.

The Eighth Annual Viticultural Convention was held at Irving Hall, San Francisco, on May 18th and 19th, under the management of this Commission. I was unfortunately detained at my home by reason of illness, and Mr. I. DeTurk acted as Chairman in my place. This convention was almost wholly devoted to the World's Fair, and how to exhibit there, and the work there started has been of great value to the wine producers and merchants who intend exhibiting. The full proceedings of this convention appear as an appendix to this report.

RESISTANT STOCKS FOR VITICULTURISTS.

There is every indication that an era of planting is about to set in in Napa and Sonoma Counties, where the phylloxera has done the most damage, and it seems to me that steps should be taken to insure that the proper resistant stock will be on hand when wanted. Last winter the demand for *Riparia* and *Lenoir* cuttings, and especially for rooted stock, was so great that it could not be met—even this when there has been so little replanting, comparatively. In this connection I desire to draw attention to a suggestion made by Viticultural Commissioner E. C. Priber in his 1890 report. He said:

"The experience with resistant vines in France, where the production is now rapidly increasing, in consequence of the replanting of those vineyards which were destroyed by the phylloxera, should teach us a lesson. It cannot be impressed too strongly upon our growers that the replacing of their diseased vines by *Riparias* is the only true salvation for their vineyards, and it might be advisable for our Board to consider if our funds, and the law which appropriates them, would not permit the furnishing of *Riparia* roots to the vine growers. We would also

recommend to use all efforts in inducing the growers to pull out and burn up all diseased vines, the present condition of affected vineyards in this State containing these diseased vines making them hotbeds for the propagation of this plague. Experience has shown that where diseased vines have been pulled out and destroyed, the progress of the phylloxera has been comparatively slow."

The regular nurserymen appear unable to meet the demand for this stock, and I would recommend that a State nursery be created temporarily, from which those growers who wish resistant stock could obtain approved and accepted varieties. In this connection, it affords me pleasure to state that Mr. Clarence J. Wetmore, the Chief Executive Officer, is now working on a report on the adaptability of the different resistant stocks and hybrids used in France to our soils. It seems to me that a careful study of these hybrids should be made. We know little of them in California except from published French works, and some of them may prove of value to us. This could be done in connection with the operations on the proposed State nursery, or elsewhere.

PRODUCTION OF WINE.

The production of wine remains about stationary, and will be so for several years to come. The increase which came from new vineyards coming into bearing has been compensated for by the decrease due to the Anaheim disease, to the destruction of vineyards in Napa and Sonoma Counties by phylloxera, and to the rooting up of vineyards by discouraged growers. The estimated production since 1890, at which time ex-President I. DeTurk closed his report, has been as follows:

1890	18,000,000 gallons.
1891	20,000,000 gallons.
1892 (estimated)	10,000,000 gallons.

The estimated decrease in 1892 is due to the frosts which wrought such havoc in Napa and Sonoma Counties; to coulure, not only in those districts, but in Livermore Valley and elsewhere; and to hot weather before the vintage. The price paid for grapes last year ranged from $10 to $25 or $30 per ton, the latter for such grapes as the Cabernets, Petit Pinot, etc.

PRODUCTION OF BRANDY.

Stimulated by the low price of grapes and wine, and by the encouragement offered to shippers to send their brandy to the markets of England and Germany, the distillation of brandy has grown apace, and the brandy business is now one of the most solid and satisfactory branches of the viticultural industry.

The production in California for the fiscal year ending June 30, 1891, was 1,475,525 proof gallons, and for the fiscal year just closed it will undoubtedly be much larger, though definite figures showing the increase are not yet at hand, the Commissioner of Internal Revenue having not yet published the statistics.

The number of distilleries in operation in the State is about two hundred and fifty, and I am informed that a large distilling interest is about to spring up in Fresno, Tulare, and Kern Counties to handle second and third-crop Muscat grapes. What the effect of this will be remains to be

seen. I am of the opinion that the distillers who are embarking in this business should move with great caution. There is undoubtedly a demand, though not a great one, for the peculiarly flavored spirit which the Muscat produces, but an overproduction will assuredly prove disastrous.

PRODUCTION OF RAISINS.

It is difficult to closely approximate the production of raisins in California. The annual yield is growing so rapidly, and so much is being shipped in sacks, aside from what is sent out in boxes, that it is difficult to estimate the product in the usual unit; *i. e.*, twenty-pound boxes.

The most important contribution of the Commission on this subject within the past two years was the report of Commissioner (now President) George West, which provoked more adverse criticism, and at the same time praise, than anything yet issued. When the new census of the raisin vineyards of the State is taken—a work which I sincerely hope will be undertaken in the spring—we will be able to speak more fully and definitely of the future prospects of this business.

I estimate the production of raisins, in twenty-pound boxes, in the past two years as follows:

1890	2,040,000 twenty-pound boxes.
1891	2,500,000 twenty-pound boxes.
1892 (estimated)	3,100,000 twenty-pound boxes.

DRYING WINE GRAPES.

The drying of wine grapes, as a means of disposing of the surplus product in those districts where open-air drying is possible, has not yet ceased, nor is there any reason to believe that it will cease until the price of wine grapes rises to such a figure as to render drying unprofitable.

Disappointment has met every endeavor to market this product abroad, but this is not to be greatly regretted, as an American market has been developed which gives every evidence of permanency. I am informed by the leading fruit commission houses that the dried wine grape, and particularly the dried Zinfandel, is becoming a great favorite in certain sections in the East for culinary purposes. The grapes are a favorite substitute for other dried fruit, and make a tart sauce which is not obtainable either from ordinary stone fruits, such as plums, prunes, peaches, etc., or from raisins.

The extent of drying is well nigh impossible to reach with any degree of accuracy. Certain it is that during the vintage of 1890, and again in 1891, the quantity of grapes so handled was large. Last season (the vintage of 1891) the prices ranged from 2¾ to 3 cents per pound, and already this season 3½ cents per pound is offered in spite of the promised heavy yield of raisins. These prices enable producers to make a fair return on their investment in vineyards.

THE SWEET WINE BILL.

The long-desired "Sweet Wine Bill," which permits the fortification of sweet wines with brandy without payment of the internal revenue tax on the spirit used, has at last passed Congress. The law is now in

operation, and in the season of 1891–92 about 2,900,000 gallons of different varieties of sweet wines were made under its provisions. This practically includes all such wines made in the State.

There has been some difference of opinion regarding the regulations under which the law is administered, and particularly over the establishment of the so-called "Sweet Wine Room" in the wineries, in which the fortification of the wine is accomplished. Time can only tell whether this provision is for the best. Many of the sweet wine makers are heartily in favor of it, others are not.

Attempts have been made at the present session of Congress to change the law so as to permit the use of corn spirit for fortification, and to permit the fortification of dry wines.

Both of these propositions, which emanate from one quarter in western New York, have been bitterly and strongly resisted by this Board. The law as it stands is in favor of grape products only in making sweet wines—that is, in favor of purity. This Commission stands committed to the policy that only grape products should go into sweet wines as a matter of health and purity, and believes that no corn spirit should be permitted.

On the other proposition, the fortification of dry wines for domestic consumption free of tax, there can be but one opinion. Should it pass, all wines can be fortified and stretched at will, and there will be but little need of vineyards.

This part of the proposed change of the bill has also been warmly opposed, and the Board is assured by the California Senators and Representatives in Congress that there is little likelihood of either amendment being adopted.

STATISTICAL.

The statistics of the receipts and shipments of wines and brandies have been carefully kept by the Secretary. The movement of wine and brandy since the report of ex-President DeTurk in 1890, will be found appended:

RECEIPTS OF WINE AND BRANDIES AT SAN FRANCISCO FROM THE INTERIOR.

Year.	Wine—Gallons.	Brandy—Gallons.
1890	11,561,076	540,357
1891	12,576,665	712,462

TOTAL WINE SHIPMENTS.

Year.	By Sea—		By Rail—		Total—		Total Value.	Average Price per Gallon.
	Cases.	Gallons.	Cases.	Gallons.	Cases.	Gallons.		
1890	9,058	4,150,393	*	4,941,689	*9,058	9,092,082	$3,972,492	$0 43 4/10
1891	14,289	5,492,850	30,326	5,621,179	44,615	11,114,029	5,001,781	45

* No overland case report.

TOTAL BRANDY SHIPMENTS.

Year.	By Sea—		By Rail—		Total—		Total Value.	Average Price per Gallon.
	Cases.	Gallons.	Cases.	Gallons.	Cases.	Gallons.		
1890	436	303,257	*	296,840	*436	600,097	$909,641	$1 51
1891	414	493,726	1,225	305,886	1,639	799,612	1,217,419	1 52

* No overland case report.

In view of the rapid growth of the shipments, it is interesting to note in what direction the wine trade is increasing most rapidly. The following tables, showing the distribution of the wine exports by sea, will thus be found of value:

TO NEW YORK. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	1,240	3,791,942	$1,570,429
1891	1,862	4,939,737	2,243,067

TO CENTRAL AMERICA. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	4,150	61,165	$66,237
1891	8,607	109,813	133,835

TO MEXICO. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	1,108	68,563	$44,123
1891	849	87,828	46,498

TO HAWAII. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	671	118,986	$88,733
1891	813	152,591	111,274

TO BRITISH COLUMBIA. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	1,035	20,380	$19,673
1891	619	30,654	17,518

To Japan and China. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	324	23,076	$10,531
1891	796	60,697	24,655

To Europe. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	305	43,687	$24,722
1891	514	84,365	39,762

To Tahiti. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	25	20,714	$7,684
1891	42	12,978	4,875

To All Other Foreign Ports. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	200	4,758	$3,766
1891	187	14,087	10,766

The exports of brandy by sea during the two years 1890 and 1891, were as follows:

To New York. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	80	228,037	$353,294
1891	39	319,203	611,918

To All Foreign Ports. (By sea.)

Year.	Cases.	Gallons.	Value.
1890	356	75,220	$109,827
1891	375	174,523	134,422

Through the work of the State, assisted by private enterprise, all wine makers and merchants are now in a position to judge exactly of the condition of the trade outside of California. Not only are the sea shipments known, these being regularly obtained by the Secretary, but private enterprise has enabled us to know the exact distribution of all wine shipped by rail out of the State to all the principal points in the East and in the Rocky Mountain States and Territories.

We are now without absolute data concerning the trade with Oregon, Washington, Nevada, and Arizona, as well as the domestic trade of California. The figures for these States and Territories can be easily obtained, and I would suggest that it is a part of the duty of this Commission to obtain them, in the interest of all producers and shippers of wine and brandy.

To show the status of the trade in imported wines and brandies at San Francisco in the past two years, the following tables prepared from official statistics are presented:

IMPORTS OF STILL WINES IN CASKS.

Year.	Gallons.	Value.
1890	71,697	$50,610
1891	60,344	42,162

IMPORTS OF STILL WINES IN BOTTLES.

Year.	Dozens.	Value.
1890	21,016	$83,526
1891	21,158	80,263

IMPORTS OF CHAMPAGNES AND ALL SPARKLING WINES.

Year.	Dozens.	Value.
1890	26,629	$389,891
1891	22,514	349,337

IMPORTS OF BRANDY.

Year.	Proof Gallons.	Value.
1890	34,233	$80,332
1891	22,226	56,388

APPROPRIATIONS NEEDED.

Considering the magnitude of the viticultural industry, and the constant demands made upon the Commission for information and advice, for original publications, etc., and especially for the call for new experiments on resistant vines, the same appropriation as was granted by the last Legislature, viz., $30,000 for the two fiscal years beginning July 1, 1891, should be appropriated for the two fiscal years beginning July 1, 1893. This will enable the Commission to continue its present usefulness untrammeled, and will bring about fully commensurate results to the viticultural industry.

Respectfully submitted.

J. DEBARTH SHORB,
President 1891–92.

PROGRESS REPORTS OF C. A. WETMORE AND C. J. WETMORE

Chief Executive Officers.

(FIRST REPORT.)

REPORT OF CHARLES A. WETMORE, Chief Executive Officer.

Read at the meeting held June 8, 1891.

SAN FRANCISCO, June 8, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith submit a copy of an analytical review of the United States law affecting sweet wines, which I prepared as Chairman of the local Wine Growers' Committee, of Livermore, and which has been transcribed at the request of your Executive Committee, to be forwarded to Mr. F. A. West, now in Washington. [This has been published in pamphlet form.—Secretary.] If this analysis of the law should meet with your approval, I suggest that it would be well to have it printed in pamphlet form for future reference.

It is a matter of great interest to the wine makers of this State, and more particularly to the vine growers who sell their grapes and do not make wine, that the widest possible market for grapes should be created, and that every legitimate method of making pure wines should be fostered and protected against arbitrary rules. In restricting the Sweet Wine law to pure sweet wines made from grapes crushed at the premises of the wine maker in the vineyard district, it was only intended to prevent the use of free spirits in the manufacture of bogus, imitation, or adulterated wines. The law was intended to benefit the grower of grapes; it was not intended to set up any unusual or novel method of using grapes in making sweet wines. It is to the interest of the vine growers of California that such a construction of this law should be made as is necessary to permit Eastern wine makers to make wines out of grapes only, and where it is impossible for them to obtain sufficient saccharine strength in one place, it is to be presumed that they will be permitted to obtain it in another, provided, that the material used comes solely from the grape, and is used in connection with legitimate fermentation of the grapes produced in the vicinity of the wine maker.

We desire that the Eastern wine makers may be permitted to use concentrated or boiled grape juice from California whenever their necessities require the same; and if such ruling is made by the department in Washington, the Eastern wine maker will be enabled to use not only our condensed musts, but also our pure brandies in making sweet wines out of Eastern grapes, and our interests as well as the interest of all vine growers, whether East or West, will be subserved, by preventing the necessity of resorting to adulteration or imitation.

HOW CAN THE MARKET VALUE OF GRAPES BE INCREASED IN CALIFORNIA?

The most important question for our people in California at the present time is how to provide a practical method of overcoming the unhealthy condition now prevailing in the market for wine grapes. We all know that deficiency of capital is the only cause of the present unsatisfactory condition of affairs. Through want of capital to develop and complete vineyard operations, to improve and perfect wines, and to hold the same subject to normal demands of the market, our vine growers are compelled to sell their products at prices frequently less than the cost of production.

Temporary relief could be obtained by reducing the amount of grapes which are converted into wine or offered for sale by wine makers. How to accomplish this has been a study of the last few years, and the necessity of the times has been partly met by the drying of wine grapes. This remedy is, however, practical only in certain places and seasons. In addition to this remedy there should be an increased production of brandy. For this purpose a large number of new distilleries in the hands of vine growers who have sufficient capital to handle grapes should be created; or, what will answer the purpose better for the present time, in all large vineyard districts there should be coöperative distilleries established by those vine growers who have grapes to sell and who desire to get remunerative prices, as well as also the prospect of better profits in the future.

It has been the habit generally of these vine growers to rely upon the resources of the relatively few who have wineries established to dispose of their grapes; the result of this reliance, however, has been disastrous to both parties concerned. Wine makers have been tempted to make more wine than their facilities or their capital would permit to be well done, and prices for grapes have necessarily fallen low. During the present year wine makers who have suffered by purchasing more grapes in the past than they could properly manage, will be tempted to offer low prices for grapes hereafter, or to refuse to purchase at all. Now, there is no good reason why vine growers who have grapes to sell should decline in future to take care of their own grapes. Generally they are found to be in better financial circumstances than those who have been buying grapes, and can therefore rely upon themselves with more safety than upon those who have helped them in the past. They owe it to themselves and to wine makers to make an immediate effort to relieve the market through their own endeavors.

In connection with the work of the vine growers of the valley where I live, I have had occasion to give some attention to this subject, and I desire now to report to you the plan which has been devised, in order that it may be copied as widely as possible and without delay.

Whatever is done for the relief of the market this year must be begun immediately. The plan is as follows:

Let some man or committee of men, having business qualifications, in each district, go immediately to those vine growers who have grapes to sell and procure from them contracts promising to deliver a certain number of tons of grapes to a trustee who shall be authorized to proceed for them to organize a company, the cost of which shall be paid for by the brandy which shall be distilled from the grapes contributed. Let us suppose that contracts amounting to two thousand tons of

grapes or more have been procured in one locality; let there be a nominal price fixed for those grapes with a certain standard of sweetness, say $10 per ton for grapes with 22 per cent or more of sugar, price to be reduced proportionally as the sugar shall fall under 22 per cent; but no variation in price for sugar contained above the standard. If variation in price should be fixed for grapes above the standard, it would probably defeat the purpose of the organization by causing growers to refuse to pick early when required.

Practical men will be free to say that grapes distilled and sold within six months after vintage will return an income of more than $10 per ton, so that this figure for minimum prices is within reason.

As soon as the grapes have been by these trustees fermented, distilled, and sold, the distillery buildings, cooperage, and other appurtenances which have been created in order to work this plan, may be then out of debt and transferred to the proposed company, and stock issued to those who furnished grapes in proportion to the nominal value as agreed. In this way an effective plant for distilling can be created and paid for within six months from the time of vintage, and there would probably be also a profit, out of which a dividend might be declared, or which might be better used in adding further facilities and cooperage, so that during the next year, if deemed advisable, a portion of the crops offered by the stockholders might be kept as wine without distilling.

Now, as to the practical method of perfecting this plan in different localities. The trouble with the vine growers is that not many of them can pay assessments in cash, but nearly all of them could furnish from one half to the entire amount of their crops, in lieu of cash; some might not be able to furnish more than half, reserving the other half for sale elsewhere to cover their current expenses. The trustee, or trustees, who undertake to carry out such a plan, after they have procured valid contracts for the grapes, with authority to dispose of them, as has been suggested, would find little difficulty in procuring capital or credit to create the necessary plant, with the assurance that they could give that the product in brandy would be realized upon within six months; in fact, I know now that contracts with responsible parties could be procured for the sale of this brandy before the vintage, so that those who would be lending credit to these associations would take no risks.

Now, as to the probable cost of such an operation. Roughly estimated, $15,000 would be ample to secure land, construct cheap buildings for fermentation only, tanks for fermentation, together with an adjacent distillery of the most improved and effective pattern, capable of managing two thousand tons of grapes in one season. These two thousand tons of grapes would realize, when sold as brandy within six months, not less than $20,000, so there would be a surplus for management and expenses of operation. It is more than probable that there would be an income of at least $5,000 more, which could be used to increase the facilities of this winery and distillery for future use. Having obtained stock in this company, after the goods have been sold by the trustees each stockholder would have an interest free of debt, which would be good collateral in case he needs money in his vineyard operations.

By adopting this plan in many different districts simultaneously, and by pushing it forward vigorously in time for the next vintage, the difficulties now besetting our vine growers would be practically overcome, and next year there would be active demand for grapes at good prices.

This plan, in effect, amounts to the capitalization of the surplus grape crop in such a manner that future crops can be profitably handled, and so that during the present year any surplus of wine may be disposed of by distillation.

Unless something is done with energy by those citizens in the different districts who understand the importance of this question, and have business capacity to perfect such plans, as well as also the confidence of the community in which they live, there will be a serious depreciation this year in the price of grapes which ought not to be permitted. Local action should take place through movements inaugurated by local banks and merchants whose prosperity depends upon the success of the grape growers. These men should not wait for the growers to get together, but should immediately begin to organize such companies as have been proposed through trustees as suggested.

Respectfully submitted.

CHAS. A. WETMORE,
Chief Executive Officer.

SAN FRANCISCO, June 8, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: At your meeting to be held to-day, the election of officers for the ensuing year will require action on my office. Permit me to withdraw my supposed candidacy for reëlection, should such be contemplated.

With sincere appreciation of the uniform courtesy with which I have been treated in the past, and grateful acknowledgments of the honors that have been conferred on me, I desire to sever my official connection with the Commission, trusting that in future its work will be as valuable to the public, and even more so, than it has been in the past.

Respectfully,

CHAS. A. WETMORE,
Chief Executive Officer.

(SECOND REPORT.)

REPORT OF CLARENCE J. WETMORE, Chief Executive Officer.

Read at the meeting held December 18, 1891.

SAN FRANCISCO, December 18, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: At the request of the Executive Committee, I have spent the greater portion of the past six months in making a personal examination of the vineyards of the State for the purpose of determining the exact condition of the crop of 1891, and the extent of damage done by phylloxera, Anaheim vine disease, etc. During August I visited the following counties: Kern, Tulare, Fresno, Merced, San Joaquin, Sacramento, Tehama, and Shasta.

In Kern County the planting of grapevines only commenced in 1889, and up to the present time over 2,000 acres have been planted, almost all

in Muscats. The prospects are that a larger area will be planted to vines during the coming season.

During the past two years Tulare County has increased its area in vineyards to a great degree. A few years ago there were but a few vineyards scattered through the county; now there are planted about 20,000 acres, of which 10,000 acres were added in 1891. But few wine grapes have been planted, the bulk of the vineyards being planted in raisin grapes.

Fresno County, in 1891, added at least 10,000 acres in Muscat vines to its already large area, and it is now the banner county in the State as far as area in vineyards is concerned. The number of acres in vineyards in the county is now estimated at 60,000, of which about 55,000 acres are planted to raisin grapes. This large area will be materially increased next year, unless the present low prices of raisins put a stop to the planting. While I was in Fresno I heard of two contracts that had just been made, which called for the planting of 2,250 acres to Muscats in the spring of 1892. The high prices paid for raisins by the packers in 1890 is the cause of the general boom in Muscat planting, and the papers were full of the profits made by this and by that producer, but there was nothing said about the losses sustained by the packers. But very few of the packers made money in 1890, and so this year they held off from buying, except where they could buy at low figures. Prices of raisins have fallen this year to one half the price paid in 1890, and still the greater portion of the raisin vineyards are not yet in bearing.

Mr. George West's report on the future of the raisin industry was a timely one, and the truth of his statements has become evident to the raisin producers sooner than was expected. Unless the raisin producers can immediately find an outlet for their product in foreign countries, the raisin industry will meet with a disaster similar to what befell the wine producers after the heavy vintage of 1886. A considerable quantity of the Muscats can be used by the wine makers in making sweet Muscat wine and brandy, but the quantity they can use without injuring the market is limited. The hot weather during July did considerable damage to the first crop of Muscats, but the second crop was uninjured, and was much better than the first. The total output of raisins was larger this year than in 1890, on account of the new vineyards that had come into bearing. The wine grapes were not injured by the hot weather, and the crop was a very large one. Almost all of the wine grapes were converted into sweet wines.

In all of the above-mentioned counties the vines are looking well, except where they are planted in low places and in alkali spots. In the low places the vines are drowned out, due to the seepage from the irrigating ditches. In the alkali spots, the soil not being suitable for vine development, the vines either die or are in a sickly condition. So far the loss from either cause is not great in any of the counties of the great San Joaquin Valley.

In San Joaquin, Sacramento, Tehama, and Shasta Counties the grapes were more or less injured by the hot weather, reducing the crop from one quarter to one third in all of those counties. In some sections of Sacramento County the table grapes were in splendid condition, and I am informed by Commissioner Stephens that the prices realized for his grapes in the Eastern markets were as good, and in some instances

better, than he ever received before. Grasshoppers did some damage in Sacramento and Shasta Counties, but the most damage was done in the vicinity of Natoma, Sacramento County.

During September I visited Contra Costa, Alameda, Napa, and Sonoma Counties. In Contra Costa County I found that the hot weather had reduced the crop of wine grapes from one fourth to one third. There are but few wineries in the county. Most of the grapes are shipped to San Francisco, or to wineries outside of the county. The amount of sweet wine made in the county was small. In the Alhambra Valley a large proportion of the vineyards is planted to table grapes. The yield of table grapes was not as great this year as in 1890; especially so was this the case with the Tokay. I found no trace of the phylloxera any place in the county.

In Alameda County the crop was about 25 per cent less than in 1890, and the shortage came principally from the Livermore Valley. The shortage in that valley was due to the hot spell that came at the end of June, which reduced the crop from 30 to 40 per cent. Only one quarter as many wine grapes were dried as in 1890, but at least one thousand seven hundred tons of fresh grapes were shipped to Stockton and San Francisco. No phylloxera has as yet been discovered in the valley. Around Mission San José and Warm Springs the grape crop this year was as good as in 1890, and a full crop was harvested. The phylloxera has appeared in two places near Mission San José, but the damage done so far has been very small. In one vineyard where the phylloxera was discovered last year, about two acres of vines were taken up and the spot planted to resistant vines. This year the disease has not made its appearance in any other portion of the vineyard, and it is hoped that all of the infected vines were destroyed.

In Napa County the damage done to the grape crop by the hot weather, rain, and phylloxera was very great, and the amount of good dry wines made this year was very little over one half what was made in 1890. On the hill lands, where the phylloxera has not made an appearance, the grapes were hurt considerably by the hot weather, but were afterwards benefited by the rains that came in September. This same rain rotted a large proportion of the grapes on the low lands, so that the good it did to the hill vineyards was more than offset by the damage done to the low-land vineyards. From Napa to Rutherford the damage done by the phylloxera is very great, and it is only a question of time when all of the vineyards in that section, and in fact all of the vineyards in the valley, will have to succumb to the onward march of the phylloxera. Those vineyards grafted on resistant vines will be the only ones to escape. From Napa to Rutherford there were in 1889 about 7,000 acres of vines. Since that time at least 3,500 acres have either been destroyed by the phylloxera or are so badly infected that they do not pay to cultivate. Of the remaining 3,500 acres, the greater portion is already badly infected with the phylloxera, and must succumb within the next three years. The number of acres planted to resistant vines in that section is small, and will not exceed 1,000 acres. During the past three years the phylloxera has made great headway in the vineyards from Rutherford to Krug's Station. It is safe to say that 1,500 acres have been destroyed in this section, and fully as many more will go next year. Of all the vineyards in that section, fully three quarters of them are more or less infected. From Krug's to Calistoga

but few signs of the phylloxera are seen, and it will take some time before that section is badly injured. From the last statistics, taken in 1889, I find that the number of acres in vines in Napa County was given at 18,229. Since that time at least 4,000 acres have been destroyed by the phylloxera, and of the remaining 14,000 acres about 7,000 acres are badly infected. A number of the vineyardists are replanting their vineyards with resistant vines, but the low prices of wine and grapes that have prevailed for the past three years have discouraged most of the producers, and they have done nothing in the way of replanting. The Lenoir and Riparia are the resistant varieties that are planted in this valley. On the deep bottom lands the Lenoir does well, and so far appears to be as resistant as the Riparia. The great trouble at the present time, is for those producers who wish to replant to obtain the resistant vines. The suggestion made by Commissioner Priber that the Commission take steps to furnish the vines to the vine growers is a good one, but in order to do so the appropriation for the support of the Commission would have to be largely increased.

Sonoma County has also suffered severely from the ravages of the phylloxera. From Sonoma to Los Guilicos the greater portion of the vineyards have been destroyed, and the wineries in that section have now to procure most of their grapes from the neighborhood of Healdsburg and Geyserville. Around the town of Sonoma only such vineyards as are on resistant stocks are now bearing. If any one doubts the resistant properties of the Riparia, let him visit the vineyards of Messrs. Gundlach and Dresel, and there he will see the different varieties of vinifera in full bearing, and all grafted on Riparia vines. In that section all of the vinifera on their own roots have been killed by the phylloxera, but the vines grafted on Riparia show no signs of disease. From Santa Rosa to Cloverdale the phylloxera has as yet made no headway, and the vines in that section were in a healthy condition, and, where well cultivated, they produced this year a very good crop, although not quite as heavy as in 1890. A large amount of sweet wine was made in this section the past vintage, thus reducing the quantity of dry wines. Around Geyserville most of the grapes were converted into brandy and concentrated must.

During October I visited Santa Cruz and Santa Clara Counties, and in November visited the southern counties. In Santa Cruz and Santa Clara Counties the crop was estimated to be about one quarter short. The loss was due to the effect of the hot weather. No phylloxera has as yet been found in Santa Cruz County, and in Santa Clara County only a few spots have ever been discovered, and the loss from this source has been almost nothing. As a general thing the grape crop in Santa Clara County was better during the past season than in any other county of the State.

In the southern counties the viticultural industry has changed more during the past four years than in any other portion of the State. In 1886 the counties of Los Angeles and San Bernardino produced 4,000,000 gallons of wine, while during the past season but 500,000 gallons were made. This great reduction was due to the Anaheim vine disease, which for the past four years has destroyed all of the vineyards around Orange, Santa Ana, and Anaheim, and a large portion of the vineyards in other parts of Los Angeles County. It is estimated that at least 20,000 acres of vines have been destroyed. Before the disease appeared

the raisin vineyards in the vicinity of Orange yielded the owners $500,000 a year. In two years' time all of the vineyards were killed. A few small vineyards near Orange were planted last spring for the purpose of determining whether the vine disease had died out or not. The vines have made a good growth, and so far show no signs of disease. If they continue to thrive next year a great many vineyards will be planted in that neighborhood the following year.

The disease has also appeared in San Bernardino County, but has not done as much damage as in Los Angeles County. At Riverside wherever it shows itself the vines are taken up and oranges planted. The area in vines around Riverside is yearly decreasing. The raisin crop in that vicinity was heavy this year, and the weather was perfect for drying both the first and second crops. In the neighborhood of San Bernardino a great many Mission vines have been killed by the disease. This disease seemed to have a liking for the Mission vines, for wherever it appeared the Mission vines were among the first to go. At the Sunny Slope vineyards all of the Mission vines have been killed, while the disease has only partially killed the other varieties. As the Mission grape is a favorite one with the wine makers for making sweet wines, the prices paid for the Mission were higher this year than for the foreign varieties.

It was thought that the disease had appeared in San Diego County, in the El Cajon Valley. The only vines that I could find in that valley that were not doing well were those that had been planted on alkali spots. All of the other vines were doing well, and the crop of raisins this year was very good. At Escondido, San Diego County, the Muscat crop was a heavy one this year. The grapes there are late in ripening; the last of the first crop was still on the trays when I was there, November 13th. The second crop was left to remain on the vines, there being no winery or distillery in that neighborhood to purchase them.

After making this complete canvass of the State I have been able to make the following estimates of the crop of 1891:

Napa County	3,500,000 gallons.
Sonoma County	2,000,000 gallons.
Alameda County	1,100,000 gallons.
Contra Costa County	500,000 gallons.
Santa Clara County	4,000,000 gallons.
Santa Cruz County	300,000 gallons.
Fresno County	1,200,000 gallons.
Los Angeles County and south	500,000 gallons.
Sacramento County and north	500,000 gallons.
Other counties	1,000,000 gallons.
Total	14,600,000 gallons.

This amount includes all the wine made (exclusive of brandy), of which about 2,500,000 gallons are sweet wines and the balance dry wines. Of the 12,000,000 gallons of dry wines there are at least a million and a half gallons that will yet be distilled, leaving about 10,500,000 gallons suitable for consumption. Of this amount the merchants in San Francisco made 2,000,000 gallons, 1,500,000 will be held by producers who market their own wines, and 2,500,000 gallons have already been sold, leaving but 4,500,000 gallons of dry wines in the hands of the producers, which will be for sale before the next vintage. As we have a market now for at least 18,000,000 gallons of wine, and

our production this year was not quite 15,000,000, it will readily be seen that by the time of the next vintage the market will be bare of wines. The outlook for better prices should therefore be very encouraging to the producers who are holding their wines. The increased demand for our wines in foreign countries is one of the encouraging features at the present time. The prices paid for grapes during the past year have ruled very low, and but few vine growers have made any money, and they are naturally discouraged. Some will pull up their vines this year, others have planted trees among the vines with the intention of taking out the vines another year; the ravages of the phylloxera will destroy, yearly, many thousands of acres, and the result must be that our production will decrease each year instead of increasing. It may take one or two years more to clean up the surplus that has accumulated during the past three years. As soon as the demand and supply are equal prices must advance. The outlook now is that the demand will soon exceed the supply. From 1880 to 1885 the demand and supply kept about equal, and prices for new wines were from 20 to 35 cents a gallon. As soon as our conditions are similar to what they were during those years, prices must return to those figures. In fact they should go higher, for our wines are better now than they were in those times.

Respectfully submitted.

CLARENCE J. WETMORE,
Chief Executive Officer.

REPORT OF VITICULTURAL CAFÉ (from Dec. 1, 1890, to Dec. 1, 1891).

SAN FRANCISCO, December 17, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I submit the following report of the operations of the café:

Month.	Sold.	Other Disposition.	Corkage.	Cash Receipts.	Reserve Fund.	Paid Exhibitors.
1890—December	1,131	386	$94 45	$463 10	$26 00	$437 10
1891—January	981	451	101 30	384 30	27 55	356 75
February	848	288	81 05	329 20	21 65	307 55
March	898	302	89 65	414 90	22 10	392 80
April	766	253	94 10	348 90	29 15	319 75
May	815	327	92 65	338 15	25 40	312 75
June	1,016	252	79 05	419 30	24 55	394 75
July	724	268	75 45	315 90	22 45	293 45
August	702	228	81 80	291 00	24 75	266 25
September	523	137	62 45	203 70	16 65	187 05
October	515	345	57 60	218 20	18 70	199 50
November	719	511	62 75	335 95	17 30	318 65
Totals	9,638	3,748	$972 30	$4,062 60	$276 25	$3,786 35

Respectfully submitted.

W. H. McNEIL,
Clerk.

(THIRD REPORT.)

REPORT OF CLARENCE J. WETMORE, Chief Executive Officer.

Read at the meeting of the Board held June 13, 1892.

SAN FRANCISCO, June 13, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: During the past six months the work in my department has been performed to the best of my ability. The correspondence has been heavy, referring principally to vine diseases and the remedies for them.

Acting under directions of the Executive Committee, I issued a call for a Viticultural World's Fair Convention for May 18th and 19th. The convention was well attended, and considerable good work was done.

I have kept up the testing for alcohol by means of the ebullioscope, and during the six months have made twenty-five tests free of charge.

I am now preparing a work on the different kinds of machinery and utensils used in the wineries and vineyards of the State, and invented by our people here. I will have it ready to go in with our next report.

The café connected with our exhibit has not been given the support it deserves, and some action should be taken to-day as to the best means of conducting it or abolishing it. We are conducting the café now under a heavy expense to the State, and if the exhibitors and wine men of the State do not care to help make it a success, I think we can devote the money to a better purpose. The money could profitably be used for the viticultural exhibit at Chicago.

As the phylloxera is now making great headway in many counties of the State, I think it would be well for the Commission to obtain an experimental plot where the phylloxera now exists, and make a test of all the resistant vines known, so that a report could be made upon the same and furnished to those parties who wish to plant resistant vineyards. Such a report would be a valuable one.

Yours respectfully,

CLARENCE J. WETMORE,
Chief Executive Officer.

REPORT OF VITICULTURAL CAFÉ.

SAN FRANCISCO, June 13, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I beg to report the following operations of the café since last report, December, 1891:

	Bottles Sold.	Other Disposition.	Corkage.	Cash Received.	Reserve Fund.	Paid Exhibitors.
December	778	1,303	$62 30	$316 10	$14 15	$301 95
January	532	1,935	65 20	219 55	14 80	204 75
February	584	435	53 20	225 35	9 15	216 20
March	478	170	64 20	192 55	15 20	177 35
April	556	167	59 45	206 10	15 20	190 90
May	348	152	56 90	136 95	14 75	122 20
Totals	3,276	4,162	$361 25	$1,296 60	$83 25	$1,213 35
Sales of bottles, etc.					105 45	
					$188 70	

Respectfully submitted.

W. H. McNEIL,
Clerk.

REPORT OF CLARENCE J. WETMORE, Manager of Permanent Exhibit and Experimental Cellar.

Read at the meeting of the Board held June 8, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: As Manager of the Permanent Exhibit and Experimental Cellar, I respectfully submit the following annual report:

Since making my last report the exhibit and offices of the Commission have been moved from Platt's Hall to 317 Pine Street. This change was made September 1, 1890. When we were notified that Platt's Hall must be vacated by September 1, 1890, the Executive Committee met and decided to lease the present premises, and instructed me to fit them up for occupancy. The expenses of fitting up the place were as follows:

Carpenter's bill	$535 1
Painting	197 0
Plumbing	181 0
Total	$913 2

After all our wines had been arranged in the cellar the proprietor of the building put in an electric-light plant and boiler. The heat from the boiler raised the temperature to 80°, which temperature was, of course, too high for our wines. The proprietor did everything he could to lower the temperature, but failed. After waiting several months the proprietor agreed to let us have the adjoining cellar, which we are now occupying. From the opening of the café in the present quarters the sales of wine showed a marked increase over the sales made in the old quarters. First-class meals are served by the lessees, Messrs. Franckx & Ruhlemann.

and everything possible has been done to help both merchants and producers to introduce their wines to the public. A great many Eastern people have visited the café, and have ordered sample cases sent to their homes. A large club in New York has just ordered six cases of wine, and if the members like them more will be ordered. Up to the present time this club has not used any California wine.

The following table will show the business done in the café for the past year:

Month.	Bottles Sold.	Amount.	Corkage.	Reserve Fund.
1890—June	289	$117 80	$23 65	$29 85
July	564	226 35	37 90	13 25
August	441	185 85	41 05	14 75
September	1,119	390 20	92 80	29 25
October	801	297 35	90 30	25 45
November	782	299 35	70 85	25 00
December	1,321	463 10	94 45	26 00
1891—January	1,100	384 30	101 30	27 55
February	971	329 20	81 05	21 65
March	1,029	414 90	89 65	22 10
April	885	348 90	94 10	29 15
May	934	338 15	92 65	25 40
Totals	10,236	$3,795 45	$909 75	$289 35

The amount received from the sale of bottles amounted to $88 20, which amount has been added to the reserve fund, making $377 55. The amount on hand in the reserve fund June 1, 1890, was $67 90, making a total receipt for the fund of $445 45. The amount expended during the year for printing, etc., was $194 45, leaving a balance in the fund of $251. As this money belongs to the exhibitors, I would suggest that a portion of it be used in advertising the café and exhibit.

During the time that the cellar was so hot, a number of samples of wine in the experimental cellar were spoiled. Some of the white wines have taken on a sherry taste, and I am now leaving them to develop into sherry.

During the past month, by direction of the Executive Committee, I have furnished facilities in the cellar for experimenting with the alternating current of electricity, to determine its effect on wines. The principle was brought to my attention by Mr. William C. Spencer, and he made the experiments under my supervision. The report from Mr. Spencer will explain his method and the experiments performed. Owing to the shortness of time that the experiments have been conducted, it is impossible to arrive at any definite conclusions. I would suggest that the experiments be carried on for another month, and that Mr. Spencer be paid for his services. From the experiments already made it would seem that when the samples were exposed to the air the untreated ones took on acid faster than those not treated. To verify this statement it would be necessary to make more tests. The treatment showed more marked effects on the claret than on the white wines. I have retained samples of the wines treated, and they can be tested at any time.

During the year sixty-six samples of wine have been sent to me to be tested for alcohol, and eight samples to be tested for acid. The above tests were made free of charge.

FINANCIAL REPORT.

Amount expended from July 1, 1890, to May 1, 1891 (10 months)		$14,442 24
Estimated expenses May and June—		
Salaries	$820 00	
Rent	620 00	
Gas and water	30 00	
Office expenses	100 00	
Commissioners' expenses	150 00	
Statistics	75 00	
		1,795 00
		$16,237 24
Amount of appropriation available		17,500 00
Apparent balance unexpended		$1,262 76

C. J. WETMORE,
Manager.

REPORT OF W. B. RISING, STATE ANALYST, ON THE MANUFACTURE OF CREAM OF TARTAR.

PRELIMINARY REPORT.

BERKELEY, December 16, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I beg leave to furnish the following statement of progress made by me in the work which I was instructed by you to make in behalf of the Board.

My study and experiments have been specially directed towards the utilization of the cream of tartar in wine residues, and especially from the pomace.

Below will be found a number of determinations of the cream of tartar in pomace from various parts of the State:

Samples from I. DeTurk, Santa Rosa.

1. Red	5.98 per cent cream of tartar.
2. White	6.63 per cent cream of tartar.
3. Red	5.18 per cent cream of tartar.

Samples from H. B. Wagoner, Livermore.

4. Mataro	2.99 per cent cream of tartar.
5. Mataro	3.10 per cent cream of tartar.
6. Zinfandel	4.76 per cent cream of tartar.

These samples contained a large proportion of stems.

Samples from the Napa Valley Wine Company, Napa.

7. Carignan	5.61 per cent cream of tartar.
8. Burger	3.42 per cent cream of tartar.
9. Mission	3.57 per cent cream of tartar.
10. Malvoisie	4.89 per cent cream of tartar.
11. Zinfandel	4.99 per cent cream of tartar.

No. 11 contained some stems.

I shall continue this study with special reference to the practical and profitable extraction of the cream of tartar, the results of which will be communicated to your Board in the form of a thorough and somewhat extended report.

I have commenced an examination of the clays of the State, with a view to discover a substitute for the imported Spanish clay.

I have continued the study of mannite and milk-sour wines, which I shall continue.

The request by the Agricultural Department in Washington to your Board for a report upon the adulteration of wines on this coast is in preparation. I am very much in need of a set of analyses of standard types of wines produced here. The rules for judging of adulterations could be laid down much more closely than is now the case. (Some action was taken by your Board a year ago, I think.)

Another study has suggested itself to my mind, viz.: a more careful examination than has yet been made of the acids present in certain wines, whether free tartaric, and how much is present, or what amounts of malic, etc., and other acids.

Respectfully submitted.

W. B. RISING,
State Analyst.

SECOND REPORT.

UPON THE MANUFACTURE OF CREAM OF TARTAR FROM POMACE.

Cream of tartar may be obtained as a side product of the wine industry. The *lees* and the *pomace* are the raw materials from which it may be extracted. As is well known, cream of tartar is less soluble in water containing alcohol than in pure water; consequently the development of alcohol by the fermentation of the sugar in the grape juice tends to precipitate the cream of tartar. This precipitation is slow and dependent upon two factors, viz.: (1) The amount of tartar originally present in the grape juice, and (2) the amount of alcohol in the wine developed during fermentation. The slowness of the precipitation is only in keeping with the general principle of the formation of crystalline precipitates. A very slightly supersaturated solution of a crystalline salt separates that salt slowly. In the case of the wine this is modified and delayed very materially by the presence of the "extract matter," etc., contained in the wine. This sediment, which forms after months of standing, is known as *lees*. It is composed of impure cream of tartar, coloring matter, some tartrate of lime, and "sediment," the whole more or less suspended in the wine. The general rule observed is this: The wine is drawn off from the sediment until it becomes turbid, the muddy sediment forming the *lees*. This may be filtered and pressed, when a crude tartar or argol is obtained, which may be sold to the cream of tartar works to be refined, or may be partially refined by the wine maker by a process to be hereafter described. The wine obtained by pressing the lees will probably be best utilized by distilling it for the brandy, or the lees may be directly added to the fresh pomace when this is used to make pomace brandy. The tartrate of lime cannot be recovered by any simple process applicable at the winery, and consequently will necessarily be lost.

Treatment of crude cream of tartar, or argol, obtained by filtering and pressing the lees:—I cannot too much emphasize the importance of a knowledge of the *principles* of chemistry, and the value of some experience in chemical manipulation, in the introduction of a new industry which involves, even to a small extent, chemical principles. When exploring a new field it is well, and in many cases *absolutely* necessary to know the direction in which the object to be sought lies. We cannot explore the whole field, and it is not necessary when we know the direction. Where obstacles which cannot be passed intervene, we pass around them, but return to the straight path which leads to the object sought. A knowledge of chemical principles involved points out the path to be taken, and when we deviate for any reason from the direct path, we return to it at once and without loss of time and energy.

The general principle involved in the preparation of cream of tartar is this: This salt is several times more soluble in hot water than in cold; consequently, if we prepare a saturated solution hot (at the boiling point of water, 100° C. or 212° F.), upon allowing this solution to cool a part, the larger part of the tartar will separate upon cooling. The salt which separates will be purified, at least sufficiently for sale to the refinery. We will now have a portion of the crude tartar in a merchantable form, but another portion, however, remains in the mother liquor. This tartar could be obtained from this liquor by evaporation, but experience has shown that it is not profitable. In addition to the tartar left behind, it contains other matters ("extractive") which, to a certain extent, interfere with the crystallization of the tartar. This mother liquor must either be used again to extract crude tartar, or be precipitated by lime as tartrate of lime, or be thrown away. On a small scale the precipitation with lime is not advisable, on account of the slimy nature of the precipitate and the difficulty in manipulating it. It will only be resorted to as a last necessity as a means of saving a part of the tartar in the liquor. It molds very easily, so that much care is required to save it.

Below will be found a table showing the solubility of cream of tartar in water at different temperatures:

*30° F.	0.32 parts in 100 parts water.
50° F.	0.40 parts in 100 parts water.
68° F.	0.57 parts in 100 parts water.
86° F.	0.90 parts in 100 parts water.
104° F.	1.31 parts in 100 parts water.
122° F.	1.84 parts in 100 parts water.
140° F.	2.40 parts in 100 parts water.
158° F.	3.20 parts in 100 parts water.
176° F.	4.50 parts in 100 parts water.
194° F.	5.70 parts in 100 parts water.
212° F.	6.90 parts in 100 parts water.

A study of the above table will show how rapidly the solubility of cream of tartar increases with the temperature. While our table stops at the boiling point of water, it is fair to assume that at a still higher temperature the solubility of the tartar will be greatly increased. In a factory intended solely for the refining of crude tartar, or argol, it would be best to extract under a pressure of say 75 to 100 pounds. A solution saturated at such a temperature would contain, I should judge, from a hurried plotting of the curve of solubility, say twelve parts of the cream of tartar in one hundred parts of liquor, which, if cooled to 86°, should deposit eleven parts, *i. e.*, eleven twelfths of the amount dissolved. To effect a saturated solution it would be better to grind the crude tartar to a fine powder, adding it in slight excess. Some provision for the agitation of the tartar during the digestion would be of much advantage and shorten the time of digestion very materially. Such a method would require copper vessels and a copper coil, returning to the steam boiler the condensed steam used for heating. Inasmuch as the tartar was added in excess, this excess would remain, together with the greater part of the difficulty, soluble tartrate of lime. This could then be first added to a second charge, giving it time to digest well before adding the regular charge. As soon as the first liquor has deposited its excess of cream of tartar, it could then be used to dissolve a fresh charge of crude.

*I wish to express my obligation to Dr. McMurtin, chemist of the New York Tartar Company, who furnished me the above table.

During the discharge of the liquor from the tank or digestor where it was under the supposed pressure of 75 pounds, a very large evaporation would take place, so that fresh water must be added to the mother liquor to make up the required amount of liquid. The tartrate of lime would accumulate in the digestor, and could be used in the manufacture of tartaric acid. The process as above sketched is, in my opinion, only applicable to a factory designed to refine crude tartar. The requirements are too great to be met in an ordinary winery, and would not pay when the operation would only be carried on a small part of the year. An argol containing 60 to 85 per cent of tartar ought to bring a price proportional to the tartar contained less the cost of refining, and this would be far less at a well-equipped and well-directed factory than at any winery.

An alternative treatment of the lees will be given in connection with the extraction of the tartar from the pomace.

The pomace is the material which is left in the press after the liquid has been pressed from the grapes, and will differ according to the grapes used, the method of treatment, etc. It consists of skins, seeds, pulp, and sometimes stems, etc., of the grapes. The amount of tartar in the pomace will differ with the variety of grape, and with the locality and climate where it was grown. Sweet grapes in warm climates will contain less; sour grapes, in colder sections, more; but the greatest difference will be caused by the treatment of the grapes. When fermented upon the skins the pomace will be richer in tartar, increasing to a certain extent with the time the wine is left upon the pomace. I have examined samples of pomace from the following named vineyards, with results as given in my former report:

Samples from I. DeTurk, Santa Rosa.

1. Red	5.98 per cent cream of tartar.
2. White	6.63 per cent cream of tartar.
3. Red	5.18 per cent cream of tartar.

Samples from H. B. Wagoner, Livermore.

4. Mataro	2.99 per cent cream of tartar.
5. Mataro	3.10 per cent cream of tartar.
6. Zinfandel	4.76 per cent cream of tartar.

These samples contained a large amount of stems.

Samples from Napa Valley Wine Co.

7. Carignan	5.61 per cent cream of tartar.
8. Burger	3.42 per cent cream of tartar.
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10. Malvoisie	4.89 per cent cream of tartar.
11. Zinfandel	4.99 per cent cream of tartar.

No. 11 contained some stems.

I have made other determinations of the amount of tartar in pomace on a larger scale, taking good average samples, and can, I think, give 5.5 per cent as the average percentage of tartar contained in the pomace of the Napa Valley, where the wine has been fermented upon the pomace. In districts where the percentage of sugar in the grapes is higher, the amount of tartar will probably be less. If sugar has been added to the pomace after the first fermentation, and fermented a second time to make piquette, the tartar will be very considerably lessened. Washed pomace will contain less than unwashed, and when the pomace has been

subjected to distillation to make pomace brandy it will contain very little. The problem to be solved is the utilization of the pomace to the greatest advantage, with least cost and least trouble to the wine maker. It is not to be considered wholly as a chemical problem, viz.: The extraction of the cream of tartar, in a factory with experienced and skilled workmen and a competent directing chemist, with a laboratory, watching and testing every operation, and saving every product, even the smallest and least valuable, but rather the attempt to save something which up to this time has been thrown away.

I think it very probable that it will be found more profitable to establish a few large factories at central points, collecting the pomace and working it with greater care and saving than is possible when it is done on the smaller scale. Private enterprise and private capital will undoubtedly establish such factories and run them if they can see any return for such an investment.

PRESERVATION OF POMACE.

Pomace can be preserved for a time if closely packed in pits and covered with clay to exclude air. This, of course, is only done for a short time, to prevent the molding, which effects the complete destruction of the tartar. In fact mold is one of the enemies of the tartar, and during its extraction and crystallization is liable to greatly injure it. Between the temperatures of 75° to 100° F., it is very liable to attack it, and the process must be stopped when it once sets in. On this account the winter season is best adapted to the extraction of the tartar; then the mother liquor can be cooled to 60° F., *i. e.*, to a point below which mold is likely to form.

In my opinion the most favorable outlook for the successful extraction of tartar from the pomace is in connection with the manufacture of the brandy from the same. The suggestions which I have to offer are based upon this supposition. The preparation of pomace brandy has been so well and fully treated in the publications of your Commission that I need only refer to them at this time. The distillation of the alcohol from the pomace in no way interferes with the subsequent extraction of the cream of tartar. On the contrary it may well form a part of one and the same operation. The following steps may be mentioned in the extraction of the tartar from the pomace.

I. Distillation of the alcohol.
II. Extraction or solution of the tartar.
III. Crystallization of the tartar from the solution.
IV. Utilization of the mother liquor.

The distillation of the alcohol I pass over, because it is a process already well known and in common use.

The extraction of the tartar is accomplished at the same time that the distillation of the alcohol is carried on.

The principles involved have already been set forth pretty fully when treating of the extraction of the tartar from the lees. Water at the boiling point is able to hold in solution about 6 per cent of the cream of tartar. This is the very maximum that it can dissolve, and a long continued digestion at the boiling point is necessary to bring it to this saturation. Practically, it will be difficult to reach this point, because if this were attempted the amount extracted from the pomace with the first

treatment would be but partial, and a second or third treatment woul be required. The operation would become too complicated for sma works, and would require more time and skill than I can believe woul be profitable. Experience will soon indicate how much water must b used; if too much is used the tartar will not crystallize out, and if too littl the extraction will be but partial. I think that experience has show that about 1 per cent of tartar will remain undissolved in the pomac and that a better result will cost more than it is worth. It is desirabl to separate the liquor containing the tartar as completely as possibl from the pomace. When this mother liquor remains the cream of tarta dissolved in it will be lost. This is one reason why the extraction of tartar from the pomace is so imperfect. This hot liquor is run into ope tanks to cool. I would suggest shallow tanks, so arranged as to allow free circulation of air, so that evaporation as well as cooling may tak place. If the solution is strong enough a crystallization will begin a soon as the temperature lowers. The crystals begin to form upon th sides and bottom of the tanks, or upon any objects that may be sus pended in the liquor. Strands of rope suspended in the liquor may b used, and in time may become heavily loaded with crystals. Apparentl it makes little difference with the final yield whether the threads o rope are suspended in the liquor or not. The crystals have seemed t me to be a little purer. The length of time necessary to deposit th crystals will vary somewhat, and experience and observation will be th best guides. At the end of six days the operation will be nearly, if no entirely, ended; the liquor can be drawn off by means of a siphon an fresh liquor run into the tank. The use to be made of this mothe liquor will be discussed later on. During the hot months mold ma begin to form upon the cooling liquor, and great care should be taken t keep the place clean, and to avoid spilling mother liquor upon th ground. When rope strands have been used they may be removed a soon as they are heavily laden with crystals of tartar, and allowed t drain, and then to dry, when they are ready for market. The firs liquor will hardly deposit any crystals, because it will be difficult t bring it near enough to the point of saturation. This liquor can be use a second time, instead of fresh water, to extract the tartar from fres pomace. How far it may be wise to use the old mother liquor in th extraction of the tartar, will be a matter in which the operator will b guided by his own experience. After a time the "extract matter" wil interfere to a certain extent with the crystallization of the tartar, an fresh water must be added. As a rule, a certain amount of evaporatio will take place, and this must be made good by the addition of fres water. This is the most unsatisfactory part of the operation, and n fixed rule can be given. If mother liquor accumulates, the excess mus be run off, as any attempt to utilize it will cost more than it is wort As stated in connection with the treatment of lees, it may be treate with the milk of lime, but the process is disagreeable to manipu late, and the product not very valuable. I think I have outlined th process in such a manner that it can be successfully inaugurated an carried on within the bounds which are prescribed by the conditions o the problem.

The outfit or plant necessary for carrying out the process may requir a brief consideration. I shall not consider the various ways of handlin the pomace, and transferring it to the pomace still and emptying th

same. The "pomace still" can be used for the tartar extraction with but few modifications and alterations. Inasmuch as cream of tartar water acts upon iron, it is very desirable to substitute copper pipes for introducing the steam. It would be much better to heat the still with a closed coil, and return the condensed water to the boiler.

The vats or tanks for receiving the liquor containing the tartar may be of any convenient form and size. I would suggest moderate size and not too deep. Cheapness will be an important consideration; pine is preferable to redwood. They should be devoted exclusively to this work when once used for it. The wood takes up a considerable amount of tartar, and consequently old tanks are better than new, because they are already saturated. The last traces of tartar are removed from the tanks by scraping, the product placed in sacks and hung up to drain, and finally dried, when it will be ready for market.

The following tables, kindly furnished by the Department of Agriculture, will be of interest, showing the amount of crude cream of tartar supplied to this country by the various countries of Europe.

Up to this time the amount of tartar supplied by this country is very small, and can be almost neglected:

Imports of Crude Tartar for the Year ending June 30, 1891 (by Countries).

	Pounds.	Value.
Austria-Hungary	1,252,621	$146,354
Belgium	7,028	296
France	4,350,939	518,477
Great Britain	44,996	6,477
Canada	950	38
British-African possessions and adjacent islands	52,033	3,357
Italy	14,015,213	1,348,581
Portugal	1,711,401	157,797
Spain	25,426	1,112
Switzerland	118,495	15,018
Totals	21,579,102	$2,197,507

Importation of Crude Tartar into the United States for the Fiscal Year ending June 30, 1891 (by Ports).

Customs District.	Pounds.	Value.
Boston	147,000	$13,787
Detroit	950	38
New York	21,198,663	2,155,762
Philadelphia	219,719	26,754
St. Louis	12,770	1,166
Totals	21,579,102	$2,197,507

Value and Quantity of Crude Tartar Imported for a Series of Years.

Year.	Pounds.	Value.
1881	14,275,530	$2,266,09[illegible]
1882	18,320,366	3,013,37[illegible]
1883	16,112,427	2,702,89[illegible]
1884	19,591,039	3,265,31[illegible]
1885	17,694,336	2,950,50[illegible]
1886	16,041,666	2,605,10[illegible]
1887	22,024,768	3,412,98[illegible]
1888	17,226,491	2,320,51[illegible]
1889	21,429,434	2,490,87[illegible]
1890	24,927,373	2,800,73[illegible]
1891	21,620,695	2,197,50[illegible]

Respectfully submitted.

W. B. RISING,
State Analyst.

REPORT OF COMMISSIONER J. DE BARTH SHORB.

THE PRESENT CONDITION OF THE VINEYARDS OF THE SOUTHERN COUNTIES WITH RESPECT TO THE ANAHEIM DISEASE.

San Gabriel, Los Angeles County, Cal.,
August 8, 1892.

The vineyards in the counties of Los Angeles, Orange, San Bernardino, and San Diego may be generally said to be in better condition than they were when the special investigation into the Anaheim disease was stopped at the beginning of 1891.

Since that time there has been a steady decrease in the amount of disease amongst the vines. In some places it appears to have quite disappeared. The present condition of the vines in the different counties may be summed up as follows:

LOS ANGELES COUNTY.

The vineyards in the San Gabriel district are in good condition on the whole. A few cases of Anaheim disease may be scattered about, but none have been noticed in which the disease had started after the foliage had been put out. All the cases seen were of old standing, *i. e.*, the vines had been attacked some time during the previous seasons. In the Lamanda Park and Sierra Madre districts there was a little more disease, and a few vines—not more than half a dozen—were seen in which the disease had asserted itself after the foliage had been put out this season. Nevertheless, there was a marked improvement in the condition of the vines.

At Pomona and Spadra, where the vines had been properly cared for, the vineyards were in splendid condition. There were a very few old cases of disease, but no new ones. In this district many of the vines had been taken up to make room for fruit trees. Already over a fourth of the acreage listed in the new Directory published by the Board has been uprooted, and more will follow.

In the San Fernando Valley district, in which may be included Glendale and Tropico, some of the vineyards are in splendid condition. Others are not in such good condition. Some have been quite neglected; others only partially cared for, and in these various diseases have done much mischief. The best vineyards are in the upper part of the valley. One of these, of some two hundred acres in extent, is in splendid condition. It does not show any sign of the Anaheim disease, and indeed never has been afflicted by that malady.

In La Cañada district many of the vines have been taken out, and others will follow in the fall. The vines which are left are in good condition. There are a few scattered cases of disease, all of old standing, but in some vineyards no disease was seen.

In most of the vineyards throughout the county, though not in all,

there might be seen either small patches of vines or single plants affected by chlorosis, and there was also some sunburn. As a whole the indications are for a good crop, and in some places for a very good one.

SAN BERNARDINO COUNTY.

In the Ontario district the vineyards were all in excellent condition, having been well cared for. Not a single case of disease was seen in Ontario itself. A few miles from the township there is an old vineyard of Mission vines, over twenty years of age. This has suffered in a few isolated patches of small area from Anaheim disease, and there are still a few diseased vines, but they are all of old standing, and are confined to the originally diseased areas. The rest of the vineyard is in excellent condition.

In the Cucamonga district many of the vineyards are in good condition, though in a few there was a considerable amount of disease, several vines having been attacked after the foliage had been put out this year, but even here there seemed to be a decrease in the amount of disease. In this district there was also a considerable amount of chlorosis, and in one vineyard many vines were affected with Spanish measles.

ORANGE COUNTY.

In the county of Orange, where the disease first originated, and where, practically, every vine was destroyed, all the young vines recently planted are in a very flourishing condition; and it may be said with confidence that the disease has there run its decimating course. Although this is the case, it is very doubtful if the large acreage in vines, which formerly beautified and enriched that district, will ever be reëstablished, as the demoralized condition of both the wine and raisin markets gives small hopes of satisfactory returns on the capital, time, and labor necessary to be invested in building up these industries.

SAN DIEGO COUNTY.

In the county of San Diego, and especially in El Cajon Valley, the vines are in a remarkably healthy condition, and will produce this year an average crop of grapes. All evidences of recent incursions of the disease have disappeared, and, in fact, at no time in this very fruitful valley had it ever taken a very strong hold. It will be remembered that it was in the valley of El Cajon, where a government scientist sent out from Washington to examine into this remarkable disease saw evidences of it throughout all the vineyards, and announced to the people as the result of his investigation that within another year there would not be enough grapes grown in the valley to supply the home consumption of table grapes in San Diego City and County. I was assured by one gentleman in charge of the largest vineyard there, that this ill-advised statement has cost El Cajon Valley not less than $200,000, by frightening away intending investors. It is true, that at the time this statement was made the disease had undoubtedly made inroads in some of the vineyards, and in some places a general languishing condition of the vines was observable; but this condition was probably brought about more from an inadequate supply of water for irrigation at the

time, and from an alkali soil in some places, rather than from the effects of the Anaheim disease itself.

From want of time no recent examination of the vineyards in Ventura, Santa Barbara, or the San Joaquin Valley counties has been made, but from statements of reliable parties residing in these counties, I am assured that a general improvement in the condition of the vines is everywhere observable.

Respectfully submitted.

J. DeBARTH SHORB,
Commissioner.

REPORT OF I. DE TURK,

Commissioner for the Sonoma District.

SANTA ROSA, July 1, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith submit the following biennial report as Commissioner for the Sonoma District:

Since my last report, made in 1890, there has been but little or no planting of new vineyards in this district. The prices that have been realized for wines have been so unsatisfactory that nobody is encouraged to plant, and in the meantime the phylloxera has been steadily advancing up the Los Guilicos and Bennett Valleys toward Santa Rosa. What little planting has been done has been largely in the nature of setting out resistant stock in the vineyards already devastated by the phylloxera, and I have doubts that the area of vines in this district is as large as it was in 1890, when there were reported 24,450 acres of vines, of which 22,685 were in bearing. Another cause which has contributed to the loss of acreage, has been the uprooting of vineyards by discouraged growers, who have planted orchards and other crops instead.

Aside from the phylloxera the district has been remarkably free from insect pests. The "flea beetle" and the thrip have appeared, but have not done much damage.

The vintage of 1891 was very favorable, and if the quality and quantity of the wine produced are to be taken as indications of success, it was one of the most successful ever known in the district. The 1891 wines I believe will turn out remarkably good, but unfortunately the prices are not what is wanted.

The vintage of 1892 will be at least 33⅓ per cent short in Sonoma County. The spring frosts did much damage, particularly in the Los Guilicos Valley and other adjoining sections. This disaster was followed by several weeks of unseasonable and unusually cold weather, which further aggravated the situation and reduced the crop. This has made holders of 1891 and other wines in the county very slow about disposing of their holdings, and there is little willingness to sell, all believing that the short crops must eventually make prices better.

Through the kindness of Mr. A. V. La Motte, of Glen Ellen, Mr. Oulevy, of Kohler & Frohling's cellar at Glen Ellen, and Mr. D. D. Davisson, of Sonoma, as well as by personal observation, I am enabled to give some information as to the extent of planting with resistant vines in Sonoma Valley, around Glen Ellen, and in the Los Guilicos Valley. I should estimate the acreage in resistant stock as follows:

Grafted and in full bearing, 500 acres.

Grafted and beginning to bear, 500 acres.

Not yet grafted, 700 acres.

This is a good showing, but it will be improved upon largely when

there is the least sign of a revival in the price of wine. Let some encouragement be given to producers, and there will be many who will set about planting resistant stock and bringing a vineyard into bearing, laborious and expensive as it is.

Respectfully submitted.

I. DeTURK,
Commissioner.

METEOROLOGICAL RECORD

Of observations taken by Station Agent George R. Stone, *of Southern Pacific Company, at Santa Rosa Station, from September 1, 1890, to July 31, 1892.*

Month.	Temperature.			Rainfall — Inches.	Weather.		
	Max.	Min.	Mean.		Days Clear.	Days Cl'dy.	Days Partly Cl'dy.
1890—September	88	48	65	.20	27	1	2
October	86	40	63	------	29	------	2
November	75	33	53	------	27	------	4
December	62	31	47	3.93	15	6	10
1891—January	69	27	50	1.25	19	5	6
February	62	30	43	10.49	9	10	7
March	75	35	56	1.22	11	9	11
April	79	38	54	2.39	18	5	8
May	80	42	62	1.23	14	6	11
June	103	43	65	------	26	------	4
July	96	50	69	.75	25	3	3
August	102	50	69	------	30	------	1
September	90	67	45	.20	21	5	4
October	81	38	59	.20	22	4	5
November	79	33	56	1.50	27	4	------
December	70	27	49	8.64	11	8	12
1892—January	65	31	49	3.43	16	3	12
February	68	31	51	5.07	9	10	12
March	85	35	55	4.14	15	6	10
April	76	35	55	2.65	14	5	12
May	87	49	62	3.78	14	7	10
June	84	51	64	------	17	4	9
July	90	50	70	------	28	------	3

REPORT OF GEORGE WEST,

Commissioner for the San Joaquin District.

STOCKTON, February 1, 1891.

In reviewing the progress of grape growing in the San Joaquin district since my last report, a greater development will be shown than in any other part of the State.

In the county of San Joaquin there has been no marked increase in the acreage of vines. The entire acreage will not exceed three thousand. The vineyards are devoted exclusively to table and wine grapes, both of which are profitable. Many of the wine vineyards have paid $100 per acre at the prevailing price of $12 or $15 per ton for wine grapes.

Table grapes are more profitable, and have been sold at from $35 to $60 per ton. The demand seems unlimited, and it is probable that a large acreage will be planted. The production of wine for 1890 was five hundred thousand gallons.

Stanislaus County has done little so far, but contains thousands of acres of fine land, which will soon be developed by the several irrigation schemes now materializing. The county is well adapted to the growth of raisin grapes, to which the most attention will probably be paid for the present. There will be a large planting this winter.

Merced County has done considerable planting in the past year, and this season will see a large acreage planted to Muscats, which will undoubtedly thrive. Wines and brandies of a good quality have been produced. The county now contains nearly 2,000 acres of vines.

Kern County has about 1,200 acres of Muscats, mostly young vines, all of which are doing well. A larger planting will follow this winter.

Tulare County has done more than any county in the district, except Fresno, in developing the grape industry. The growers now number four hundred and sixty-five, owning 10,000 acres of vineyard, 2,500 acres of which are in bearing. Few wine grapes are grown. All the raisin vineyards are in good condition, and those in bearing are paying handsomely. The present winter will see an exceedingly large acreage of new vines planted.

We now turn our attention to Fresno County, the banner grape-growing county of the State.

The county contains 49,500 acres of vineyard, owned by about one thousand six hundred growers; 5,600 acres are planted in wine grapes, and 43,900 acres are in raisin grapes. The wine vineyards are nearly all in full bearing now, and are good paying investments. The vintage of 1890 was probably the largest that will be seen in California for many years, and as the production and consumption are nearly equal, the consumption increasing, and the production as large as it will be for many years, the growers can look forward with tolerable certainty to at least ten years of good prices, even if the marketing conditions were not changed. I can, however, see nothing to encourage or stimulate the planting of wine vineyards at present.

The market for the past two years has been greatly relieved by the drying of many thousand tons of wine grapes, which were sold as dried grapes. A general impression prevailed last season that these grapes were largely used in making wines in the East. In this opinion I do not share, as I know positively that very large quantities were actually sold to take the place of other dried fruits, especially prunes. There will be a market for this product until supplanted by the Muscat, but by that time the quantity now dried will not in any way affect the market when turned into wine.

Fresno County produces Ports, Sherries, Angelicas, Sweet Muscats, and brandies of excellent quality. The sweet wine industry, developed under the new Sweet Wine law, will undoubtedly assume large proportions, and the growers are certainly to be congratulated on the bright prospects for good prices, and a constantly increasing demand for their products. A very considerable export trade has been built up in the business of shipping California brandies to Europe, which will have a tendency to relieve the market of any surplus, and insure good prices.

In the wineries of Fresno County about 12,000 tons of grapes were crushed during the vintage of 1890, the product being turned into sweet wine and brandy.

It is upon the raisin business that the chief interest of the growers of this district is centered.

The importance of this industry to the State in general, and the San Joaquin Valley in particular, cannot be overestimated. There are now over two thousand three hundred vineyard proprietors in this valley, most of whom are growing raisins. This number will be largely augmented during the present winter. Large tracts of land in all the counties of the valley are being subdivided, and sold in tracts of from ten to forty acres, many of which are bought by people who intend settling upon the land purchased, and embarking their all in the raisin business. Whether they will meet with disaster or not time only can tell, but if they are planting with the idea that the present prices will be maintained, they will most unquestionably be disappointed, for the most enthusiastic prophets for the future of the business admit that prices must come down; and there are many of our best informed growers and packers who are now predicting that the raisin business will, in a few years, be in a worse condition than the wine business was in the years 1888 and 1889. This industry has been developed at such a remarkable rate, that it was deemed of the utmost importance by this Commission that the most accurate possible statistics be compiled to show the total acreage planted, the acreage in bearing, and the acreage not yet producing, in order that these figures could be placed before those who are now contemplating planting. This has been most carefully done, as the Directory of the counties mentioned will show. The result of this investigation is as follows:

County.	Total Acres in Vineyard.	Acres in Wine Grapes.	Acres in Raisin Grapes in Bearing.	Acres in Raisin Grapes not Bearing.	Total Acres in Raisin Grapes.	Number of Growers.
Fresno	49,500	5,574	17,750	26,176	43,926	1,600
Tulare	9,919	45	2,552	7,322	9,874	465
Kern	1,200			1,200	1,200	40
Merced	1,855	425	212	1,218	1,430	65
Totals	62,474	6,044	20,514	35,916	56,430	2,170

From this it will be seen that there are now planted in raisin grape in the San Joaquin Valley 56,430 acres. It will also be apparent tha 20,000 acres are in bearing now, but it must be remembered that no one half of these are in *full* bearing.

Among all growers one hundred boxes of twenty pounds each per acr is considered a very moderate yield for a raisin vineyard in full bearing Hence, the 56,000 acres in the San Joaquin Valley may be relied upo to produce in four years' time 5,600,000 boxes of raisins. Twenty thou sand acres may safely be considered planted in raisin grapes in th State outside of this valley. These vineyards will produce, when in ful bearing, 2,000,000 boxes, making a total of 7,600,000 boxes of raisins fo the State from the vineyards now planted. The plantings of the sprin of 1891 will be very large—probably 15,000 acres in this valley—whic will fully offset any part of the acreage now planted which may fron any cause prove failures. With these figures before us, which are cer tainly conservative, it is well to turn to the statistics of production an consumption in America. From the best sources of information obtain able, the following statement of production of raisins in the State sinc 1873 is given:

1873	6,000 twenty-pound boxe
1874	9,000 twenty-pound boxe
1875	11,000 twenty-pound boxe
1876	19,000 twenty-pound boxe
1877	32,000 twenty-pound boxe
1878	48,000 twenty-pound boxe
1879	65,000 twenty-pound boxe
1880	75,000 twenty-pound boxe
1881	90,000 twenty-pound boxe
1882	115,000 twenty-pound boxe
1883	140,000 twenty-pound boxe
1884	175,000 twenty-pound boxe
1885	470,000 twenty-pound boxe
1886	703,000 twenty-pound boxe
1887	800,000 twenty-pound boxe
1888	950,000 twenty-pound boxe
1889	1,250,000 twenty-pound boxe
1890 (estimated)	2,040,000 twenty-pound boxe

From the statistics of the United States Bureau of Statistics of th Treasury Department have been collected the following figures showin the total imports of raisins into the United States, in pounds. These for purposes of comparison, have been reduced to twenty-pound boxes though the bulk of foreign raisins comes in twenty-two-pound (ten-kilo gram) boxes. No figures can be obtained prior to 1884, at which tim the Bureau separated raisins from the classification of "dried fruits." The imports for the fiscal years ending June 30, were:

Year.	Pounds.	In 20-pound Boxes.
1884	53,702,220	2,685,11
1885	38,319,787	1,915,98
1886	40,387,946	2,019,39
1887	40,673,288	2,033,61
1888	40,476,763	2,023,83
1889	35,091,139	1,754,55
1890	36,914,330	1,845,71

Adding the California product in twenty-pound boxes, and the imports from abroad in the same unit, the result is the total American consumption. It results as follows:

Year.	Imported in 20-lb. Boxes.	California—20-lb. Boxes.	Total American Consumption—20-lb. Boxes.
1884	2,685,111	175,000	2,860,111
1885	1,915,989	470,000	2,385,989
1886	2,019,397	703,000	2,722,397
1887	2,033,614	800,000	2,833,614
1888	2,023,838	950,000	2,973,838
1889	1,754,557	1,250,000	3,004,557
1890	1,845,716	1,400,000	3,245,716

The above tables are for the fiscal years ending June 30th, and what effect the California crops of 1890 will have upon the imports cannot yet be told.

From these statistics it will be gathered that the total consumption of raisins in America at the present time is about 3,250,000 boxes, including dried grapes. The yield from the vineyards now planted in California, when in bearing, will, at the most conservative estimate, be more than double that amount.

The consumption of raisins in this country increased only 400,000 boxes in the years from 1884 to 1890. Allowing for a much greater proportionate increase of consumption for the next few years, the consumption of America, when the California vineyards of to-day are in bearing, may be placed at 4,000,000 boxes. From these estimates we may place the California product of 1895 at 7,600,000 boxes, and the American consumption at 4,000,000 boxes.

With these facts in view, is it not well for those who now contemplate planting raisin vineyards to pause and consider, and study well the future of the industry? It is evident that the market must be relieved in some way by exportation, or the consumption increased by a reduction in price, which will place the raisins of California on the market as a staple article of food. The shipment of green fruit to the Eastern markets would also possibly reduce the surplus to some extent. It is the opinion of many that the relief will come from increased consumption. Raisins, as used now, are a luxury, and are not found upon the tables of the poor. As a luxury, the consumption will not increase in any ratio much in excess of the increase from 1884 to 1890, mentioned above, for the reason that a rise or fall of 2 or 3 cents per pound would not in any way affect the consumption of raisins among the people who are now using them.

It is before the poorer classes that raisins must be placed as a staple article of food, at a price which will attract them. As a food nothing could be more nutritious than a raisin or dried grape. There is a small profit in growing raisins at 3 cents per pound, stemmed, and put up in sacks ready for market. This would place the raisins of California before the people of the East at a price lower than any other dried fruit, and no other fruit is so valuable as a food. When the raisins of California are so introduced, there can be no doubt but that the consumption will be wonderfully increased, but to what extent remains to be seen. This is a point which every man who now contemplates planting

a raisin vineyard should carefully consider. In any event, it will tak time to develop this market.

I believe that my estimate of the crop of 1895—7,600,000 boxes—i conservative, for the reason that it is based on an average yield of thre tons of green grapes per acre, and it is a well authenticated fact tha crops of ten tons per acre are not at all uncommon from Muscat vine yards in the San Joaquin Valley.

With a crop of 7,600,000 boxes—4,000,000 boxes of which we ma count as consumed—we have a surplus of 3,600,000 boxes, or 3,600 ca loads, to dispose of as cheap goods in 1895. No grower in planting vineyard expects to average less than five tons of grapes per acre, an if these expectations are realized, the surplus of 1895 would be 8,50 carloads. These goods will come into competition with low-grade Valen cia raisins. The tariff of course cuts a most important figure in th future of this industry. Should it be reduced, the result can but b disastrous.

It is a common assertion that we have the world for a market for ou raisins, but this claim is disputed. At the present time we could possi bly market a few fancy goods in England, but the quantity would no in any way be perceptible in the general market. It must be remembere that when foreign raisins are driven out of America, they must find market somewhere else, and if put upon the market of England, whic is already supplied, a heavy fall in prices must result, which woul make it impossible for our growers to compete with them. Furthe more, no country of Europe, except Great Britain, consumes any grea quantity of raisins.

Prices for raisins in California, for the next few years, will probabl be good. As long as prices are kept up, planting will continue. Wha the result of this indiscriminate heavy planting will be remains to b seen, and it must be remembered by those who are now planting, tha every additional 10,000 acres of good Muscat vines means an addition 1,000,000 boxes of raisins to be disposed of.

Foreign competition in our home market cannot be ignored. Th raisin vineyards of Spain are very productive, and are all in bearin Their crops will continue to be harvested and placed upon the marke of the world at a cost to the producer considerably below the cost producing in California. Furthermore, our 2½-cent duty is partly offs by the following fact: that freight on the foreign raisins to New York about 7 cents per box of twenty pounds, and the cost of packing abou 3 cents, while the freight on California raisins is about 35 cents p box, and the cost of packing 15 cents per box. The duty on the foreig raisins being 2½ cents per pound, would give our producers an appare advantage of 10 cents per box in New York.

In the above report, I have endeavored to place before the public th bare facts covering the present state of the raisin industry. The sta tistics of acreage are absolutely correct, and my estimate of the crop 1890 is as near correct as possible. The full returns will not change 100,000 boxes one way or another. It does not include 500 carloads dried grapes shipped during the past season.

It is necessary to the future of the industry that these facts becom generally known, and being known, it is for each individual to deci whether or not to engage in the industry.

APPENDIX.

The following statistics are taken from Prof. Gustav Eisen's very valuable work, "The Raisin Industry," recently published.

Exports of Valencia raisins from 1850 to 1889, according to English estimates:

Year.	England.	America.	Other Places.	Total Tons.
1850	9,423	165		9,588
1851	8,491	285	787	9,563
1852	8,844	320		9,164
1853	7,883	99	70	8,053
1854	7,206	296	50	7,552
1855	7,464	736	85	8,285
1856	8,909		12	8,921
1857	9,485			9,485
1858	13,542	654	182	14,378
1859	9,546	163	113	9,822
1860	7,257	2,831	454	10,542
1861	8,072	63	143	8,278
1862	7,564		238	7,900
1863	12,290	125	100	12,515
1864	8,655	38	182	8,875
1865	9,863	362	12	10,237
1866	12,735	402	473	13,611
1867	12,701	668	177	13,546
1868	14,293	3,095	794	18,182
1869	8,434	1,857	25	10,316
1870	10,060	2,210	110	12,380
1871	12,578	5,210	625	18,413
1872	15,677	4,088	535	20,300
1873	10,796	2,960	710	14,466
1874	13,724	5,513	439	19,676
1875	12,568	6,590	595	19,753
1876	15,272	3,816	676	19,764
1877				
1878				
1879	15,231	9,525	1,244	26,100
1880	13,026	8,977	892	22,895
1881	17,507	10,169	969	28,625
1882	18,121	21,593	1,732	41,346
1883	19,644	16,722	3,983	40,349
1884	10,210	9,686	4,289	24,185
1885	10,250	9,397	3,596	23,243
1886	15,194	15,687	6,113	36,994
1887	16,648	18,831	3,479	38,958
1888	15,524	12,245	4,655	32,424
1889	12,000	14,645	4,724	27,369

Exports of Malaga raisins from 1864 to 1889:

Year.	United States.	British Col'ies.	Great Britain.	France.	North Europe.	South America.	Sun-dries.	Total Boxes.	Total Tons
1864	879,794	45,906	258,458	137,379	59,659	109,741	209,000	1,200,000	13,2
1865	879,794	75,708	269,072	171,743	64,319	96,658	255,000	1,800,000	19,8
1866	907,305	72,208	220,756	178,862	62,076	115,305	191,000	1,750,000	19,2
1867	966,724	96,124	166,737	129,391	58,222	116,762	135,000	1,670,000	18,3
1868	1,053,726	125,407	222,426	163,306	64,262	103,082	215,000	1,950,000	22,4
1869	767,321	58,265	175,602	117,612	84,472	67,634	80,800	1,350,000	14,8
1870	1,331,937	120,039	216,015	90,103	57,687	113,755	270,000	2,200,000	24,2
1871	1,147,633	98,817	183,916	161,123	69,800	87,242	274,000	2,200,000	24,2
1872	1,325,705	95,024	383,890	230,046	72,788	119,042	--------	1,920,000	21,1
1873	1,368,822	45,495	241,325	196,239	99,424	--------	140,000	2,500,000	27,5
1874	1,320,000	43,400	240,000	200,000	99,500	--------	--------	2,160,000	23,7
1875	976,000	42,000	271,000	203,000	98,000	--------	98,000	1,670,000	18,3
1876	1,321,000	52,000	357,000	276,000	115,000	--------	91,000	2,252,000	24,7
1877	1,250,000	56,600	250,000	300,000	100,000		--------	2,200,000	24,2
1878	1,182,088	58,242	194,471	330,767	99,661	98,429	211,000	2,180,000	23,9
1879	1,146,288	30,598	237,659	368,420	107,888	63,688	170,000	2,125,000	23,3
1880	1,115,101	46,717	174,126	297,412	108,222	75,466	197,000	2,015,000	22,1
1881	1,043,727	31,730	141,415	251,382	101,828	81,196	147,000	1,800,000	19,8
1882	967,571	38,431	176,349	277,253	130,646	98,007	178,000	1,200,000	13,2
1883	--------	--------	--------	--------	--------	--------	--------	--------	----
1884	--------	--------	--------	--------	--------	--------	--------	--------	----
1885	--------	--------	--------	--------	--------	--------	--------	--------	----
1886	--------	--------	--------	--------	--------	--------	--------	--------	----
1887	--------	--------	--------	--------	--------	--------	--------	850,000	9,3
1888	--------	--------	--------	--------	--------	--------	--------	850,000	8,2
1889	120,000	--------	--------	--------	--------	--------	--------	750,000	----

Production and distribution of Smyrna raisins from 1844 to 188 according to the United States consular reports:

	To
1844	8,0
1868	19,0
1871	48,0
1872	31,0
1879	75,0
1881	49,0
1884	95,0

According to English estimates the raisin crop of Smyrna only reache twenty-seven thousand tons in 1876, and was divided as follows:

	Tons.	
RED RAISINS.		
Chesme	5,100	
Vourla	5,000	
Yerly	2,800	
Carabourna	1,600	
		14,5
SULTANAS.		
Chesme	7,400	
Vourla	3,100	
Yerly	1,150	
Carabourna	800	
		12,4
Grand total		26,9

This crop was distributed as follows:

RED RAISINS.	Tons.	
England	2,699	
North of Europe	6,488	
Trieste	2,250	
Russia and Turkey	2,995	
		14,442
SULTANAS.		
England	7,945	
North of Europe	1,525	
Trieste	2,820	
Russia, etc.	285	
		12,575
Grand total		27,017

The world's raisin production in 1889:

	Tons.
Greece	125,000
Smyrna	120,000
Valencia	28,000
Lipari, Calabria, and Pantellaria	15,000
California	10,000
Malaga	8,000
Scattering	5,000
Chile	1,000
	312,000

The above does not include dried wine grapes from Italy, California, Algiers, nor any raisins made in Victoria (Australia).

[In viewing these figures it must be remembered that the products of Greece and Smyrna are principally currants, sultanas, and dried wine grapes.—*George West.*]

Statement showing the quantity and value of currants and raisins imported and entered for consumption in the United States from 1873 to 1878:

Year Ending June 30th.	Raisins.		Currants—Zante and all Others.	
	Quantity—lbs.	Value.	Quantity—lbs.	Value.
1873	35,271,312	$2,292,948 83	14,141,797	$566,386 49
1874	36,419,922	2,544,605 95	19,319,191	752,694 00
1875	30,501,316	2,443,155 50	19,334,458	771,384 56
1876	32,221,065	2,425,277 14	20,911,061	856,425 62
1877	32,419,637	2,109,333 60	17,152,664	749,488 00
1878	32,931,736	1,904,866 13	17,941,352	776,827 00

Statement showing the quantity and value of currants and raisins imported and entered for consumption in the United States, with rates of duty, etc., from 1879 to 1888:

RAISINS.

Year Ending June 30th.	Quantity—Pounds.	Value.	Rate of Duty per Pound.	Am't of Duty Collected.	Additional an Discriminat ing Duty.
1879	38,523,535	$1,943,941 14	2½ cents.	$963,088 42	$92
1880	39,542,925	2,274,763 00	2½ cents.	988,573 19	48
1881	39,654,755	2,711,771 74	2½ cents.	991,368 95	80
1882	43,779,867	3,260,033 74	2½ cents.	1,094,496 71	----------
1883	51,487,389	3,495,599 45	2½ cents.	1,287,184 77	20
1884	56,676,658	3,543,916 15	2 cents.	1,133,533 15	52
1885	39,778,695	2,728,847 46	2 cents.	795,573 90	247
1886	37,999,306	2,782,599 76	2 cents.	759,986 12	50
1887	40,660,603	2,297,469 30	2 cents.	813,212 06	34
1888	40,340,117	2,098,503 00	2 cents.	806,802 32	80

CURRANTS—ZANTE AND OTHERS.

Year Ending June 30th.	Quantity—Pounds.	Value.	Rate of Duty per Pound.	Am't of Duty Collected.	Additional an Discriminat ing Duty.
1879	17,405,347	$520,831 07	1c per lb.	$174,053 47	----------
1880	18,007,492	600,603 40	1c per lb.	180,074 92	----------
1881	21,631,512	845,773 00	1c per lb.	216,315 12	----------
1882	32,592,231	1,388,886 00	1c per lb.	325,922 31	----------
1883	31,171,171	1,247,504 00	1c per lb.	311,711 71	----------
1884	32,743,712	1,220,575 16	1c per lb.	327,437 12	----------
1885	25,534,507	723,415 00	1c per lb.	255,345 07	----------
1886	22,623,171	744,784 00	1c per lb.	226,231 71	$117
1887	29,196,393	1,062,326 00	1c per lb.	291,963 93	----------
1888	30,636,424	1,176,532 76	1c per lb.	306,364 24	----------

Respectfully submitted.

GEORGE WEST,
Commissioner for the San Joaquin District.

SUPPLEMENTARY REPORT.

STOCKTON, CAL., August 16, 1892.

Since my last report there has been no material change in the condi tion of the viticultural interests in this district.

In San Joaquin County little interest has ever been taken in vin growing, although the vineyards now planted produce large crops, whic have always commanded fair prices, and have yielded returns much mor remunerative than grain. This is especially true of table grapes, whic can always be relied upon to produce $100 per acre at present price There seems no immediate danger of overdoing this branch of the indu try, although the market will always be uncertain and fluctuate wit the fruit crop of the East. All table grapes will produce a good neutr brandy, and consequently will be in demand at the wineries in yea of depression at approximately the same price paid for low-grade win grapes.

There has been no increase in the acreage of vines in San Joaqui County.

Stanislaus County planted quite an area in raisin grapes in the wint of 1890–91. The same may be said of Merced, Tulare, and Ker

Counties, while it is probable that 10,000 acres of Muscats were planted in the winter of 1890–91. It is only fair to estimate that the plant of 1891–92 would no more than offset the acreage of older vines abandoned because planted on poor lands.

Fresno County is, of course, the leading grape-growing county of the district.

The business of growing wine grapes in this county has suffered with the general depression throughout the State. The wine market presents the remarkable spectacle of increased consumption, decreased production, and low prices. This state of affairs cannot long exist, and a reaction is sure to come.

The vintage of 1891 in Fresno was very large, and the prices were unsatisfactory. The coming vintage will be relieved by the drying of a considerable amount of wine grapes.

Contrary to my expectations the prices received by the raisin growers for their crop of 1891 were hardly satisfactory. The crop of 1892 was severely damaged by coulure—so severely indeed as to amount to an almost total loss of the fruit crop in many of the young vineyards. In consequence of this, and also of the general shortage of the fruit crop in the East, the prices for the year 1892 will be highly remunerative. This fact, however, should not induce extension of the acreage devoted to the cultivation of the Muscat grape, for there is nothing in the present outlook to justify the venture. By far the largest part of the vineyards of the valley are not yet in bearing, and will at the next good season produce a crop so unwieldy as to completely demoralize the whole industry, unless steps are taken to provide all possible outlets and to vastly improve the facilities for handling the crop. One of the most serious features of the whole situation is the competition of the Zante currant, now admitted into this country free of duty. Immense quantities of these currants are dumped on the markets of New York at prices which we cannot meet—especially with labor costing $1 50 per day against European labor costing about 20 cents per day.

Those growers who have established brands will always be in position to command better prices for their goods than those who are compelled to sell to the packers.

The disposition of the second-crop Muscats is a matter worthy of the most serious consideration. A yield of one ton per acre of second-crop grapes from the raisin vineyards of Fresno and Tulare, when in full bearing, will produce an aggregate tonnage appalling to contemplate. It is conceded by all growers that the drying of this second crop will in a few years be out of the question. What can be done with them? There will be thousands upon thousands of tons to dispose of. During the past summer a great deal has been said about converting these second-crop grapes into wine and brandy, but the amount which could be so consumed would not in any way affect the aggregate production of grapes. The wine market is, has been, and will be fully supplied by the vineyards planted in wine grapes, and the wineries will naturally handle all the Muscats that can possibly be marketed. So much can be used, and no more; and an attempt to force any large amount of Muscat wine or brandy into consumption would result simply in depressing the market so that there would be no profit left. The flavor of the Muscat brandy is very pronounced, and is much admired by some people.

However, to the general public it is unknown, and to cultivate th public taste will take years. If some means could be devised for mak ing neutral grape spirit from the second-crop Muscat, the whole questio would be solved, for a very large amount of such spirit could be exporte

The making of table syrup is a matter which should be investigate by the raisin growers of Fresno. Such a syrup, condensed under vacuum, would present a beautiful appearance, and would be an articl which could possibly be exported. There are several methods of pr ducing this syrup. I have devoted considerable attention to this matte and carried out a line of experiments with Mr. H. S. Lord, of Hartfor Connecticut, which demonstrated that an article could be produce pleasing both to the eye and to the taste. There would be a large ma ket for such a product as a temperance fruit drink, and also as a syru for general table and household use. There is also another proces owned by the Yaryan Company of Toledo, Ohio. These should both b investigated by the raisin growers of the San Joaquin Valley. The may be some methods in use in the South which would be practic here.

I have in this report made no attempt at the compilation of statistic total production, importations, consumption, etc., but shall in my ne report give as close estimates as possible for the years 1891 and 1892.

I am aware that the publication of reports and statistics of the ge eral tenor of my report of 1890 is not popular with the people who ow large tracts of land which they would like to subdivide and sell, but i closing I would state that the opinions I have advanced are backed b the most practical growers of California.

Respectfully submitted.

GEORGE WEST,
Commissioner for the San Joaquin District.

REPORT OF E. C. PRIBER,

Commissioner for the Napa District.

NAPA, December 22, 1890.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I hand you herewith reports and statistics of Napa County collected by A. Warren Robinson. I am glad to see that the statistics of Napa County have been collected with a great deal of care, and hope that all of my reports will prove quite satisfactory.

Yours truly,

E. C. PRIBER.

To E. C. PRIBER, *Viticultural Commissioner for the Napa District:*

DEAR SIR: I beg leave to submit the following viticultural report for Napa County, as per your instructions and blanks furnished November 30, 1890.

I have made a very thorough canvass of the county, and am confident the statistics gathered are as complete as possible. Not that every vineyard has been enumerated, for there are in several out-of-the-way localities small vineyards that it was almost impossible to find. But I have taken much pains to cover most of the ground, and have done the very best I could.

Napa County is preëminently the home of the vine, and vineyards are to be found in almost every section joining one another, scores in number in some localities, in others scattered. Consequently in gathering statistics considerable labor and much time were required in riding through valleys, in out-of-the-way glens, and upon rough hillsides; for though the main vineyard belt lies in Napa Valley, between the towns of Yountville and St. Helena, numerous vineyards of greater or less extent are located upon the more elevated hillsides or table-lands.

Between the towns above mentioned the valley is covered with a solid vineyard, so to speak, extending not only over the lower level land, but away up on the slopes of the bordering hills, both on the east and on the west sides. In the vicinity of Calistoga, and above that town in the direction of Knights Valley, there is a large tract of vineyard, as well as on the hills to the west of the town named.

Not much attention is paid to viticulture in Pope Valley—there being in that section but fifteen or twenty small vineyards—owing probably to the expense of transporting grapes and wine over Howell Mountain to the town of St. Helena.

On Howell Mountain there are several fine vineyards, planted eight or ten years ago on virgin soil, from much of which the primitive forest had recently been removed.

Within the narrow confines of Conn Valley and upon the hillsides near at hand, there are many vineyards and several wine cellars, and

in Chiles Valley also; although in the latter locality vineyards are no numerous.

In Foss Valley and on the adjacent hills there are but few vineyards In Berryessa Valley none to speak of, of any extent. Wooden, Gordon and Capelle Valleys have but few vineyards, though vines bear wel According to returns from Gordon Valley, near the Solano County line south of Napa City, few vines are cultivated. Very few vines are foun in the Suscol district. To the west of Napa City, towards Sonoma, ther are several vineyards, the majority of which are not to be classed amon the larger ones of the upper Napa Valley.

Throughout the entire county the principal varieties of grapes raise are Zinfandel, Riesling, and Chasselas (Golden and Fontainebleau) These varieties are to be found in almost every vineyard, as they ar esteemed to be among the best for wine making. In many vineyard finer foreign varieties that have been found excellent for wine makin are grown. For instance, Mataro, Sauvignon Vert, St. Macaire, Bur gundy, etc.

The acreage of table grapes in the county is exceedingly limited Malvoisies have been rated under the head of wine grapes, as, for th greater part, they have been sold to wine makers; in fact, comparativel few Malvoisies are now raised. Very few Muscat, Tokay, or other varieti of table grapes have been shipped from Napa Valley this year, thoug a few carloads have been sent East.

The yield of grapes this season has varied in different localities. Som vineyards bore larger crops than their owners anticipated early in th season. There were no extensive killing frosts in the spring, no sever blighting winds, and little hot weather later in the season to injur grapes to any great extent. Other vineyards yielded but moderat crops, causes for which will appear farther on.

A few vineyards—and but few—received little or no care during th entire season, the owners having been discouraged by reason of the lov prices for grapes that have ruled during the last three or four years Nearly every wine cellar in the county has been the scene of activit during the vintage, and the cooperage has, for the most part, been filled Fermentation has progressed favorably, the new wine is being racke off, and what now is of the most interest to cellarmen is the price the will obtain for their output.

The price for grapes has ruled higher this season than for several pre ceding years, varying from $12 to $22 per ton, according to variety.

In certain localities the deadly phylloxera is rapidly making inroads and some of our fairest vineyards are gradually succumbing to th attacks of this insatiable pest. In fact, this disease is widespread, an bids fair to materially change the viticultural outlook in the course o a few years. In many vineyards diseased vines are being uprooted their places being supplied with resistant stocks, or in other cases, wher the small vineyardist cannot afford the expense of the long time of wait ing, the ground will be planted to grain crops or to orchard. Resistant have done well, and those vineyardists who have got them are please with their success.

There are numerous thrifty vineyards where the phylloxera has no appeared that yield excellent crops.

Very few new vineyards have been planted this season, for variou reasons. Should the new wine bring good prices, probably it woul

induce several persons to plant new vineyards another season, or to enlarge those already planted.

In conclusion, I find that there are in the county:

Number of vine growers of five acres or more	619.
Total acreage in vines	18,229 acres.
Total acreage in bearing vines	17,003 acres.
Amount of grapes raised in 1889	54,361 tons.
Wine made	4,252,800 gallons.

Much reluctance was manifested upon the part of some vineyardists to give any statistics, while others absolutely refused, they evidently thinking that by giving the information sought their business would be injured to greater or less extent. However, on the whole I have been courteously received.

I have obtained at most of the cellars in the county the amount of wine made this season; from several cellarmen I could not get figures. To the amount given 500,000 gallons might be added. To the tonnage of this season might be added 300 tons.

But it must be borne in mind that much of the new wine will be distilled. In fact, considerable of it is now being made into brandy, and there will be a loss in racking off. The yield will probably exceed that of 1889.

This completes my report. I hope it will prove satisfactory. I have done my best to make it so.

Respectfully submitted.

A. WARREN ROBINSON.

SUPPLEMENTARY REPORT.

NAPA, CAL., September 3, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: The two years that have elapsed since my last report have brought no changes in the general situation of the wine industry in my district.

By the ravages of the phylloxera and the neglect of some vineyards crops have continued to decrease, till our production has fallen from 5,000,000 to 2,000,000 gallons, which is the estimate for this fall's crop.

As much as the present condition of our industry is to be deplored, we have gained some very valuable experience by the depression. The phylloxera began with its destruction in the lower valley. A large portion of the vineyards destroyed are those which produced heavy crops, but not of the finest quality, and in consequence the average quality of Napa wines is far better to-day than it has been in previous years. It is exceedingly gratifying that with all the depression in the market the best brands of Napa wines are not only well known, but demanded and asked for all over the United States, and even in foreign countries, at respectable prices. It is a pleasure for me to state that the method to introduce in the market special brands in bottled wines has been followed by a great many of our best wine producers, with a success which can easily be perceived by the increased demand. Napa is, without question, the wine district of the State which has the largest number of well-equipped cellars. More of the wine makers now know

how to discriminate between the different qualities of wine, and, as is shown by the statistical figures given below, distilled during the fiscal year of 1891–92 from a remarkably small vintage more wine than in the previous year, solely to avoid placing on the market wines that were not absolutely sound and of good quality.

The confidence of our vintners in the ultimate success of their efforts to produce the wines for the world, is best illustrated by the lively interest they show in the coming World's Fair at Chicago. Fourteen vine growers of Napa have applied for space, and intend to compete for prizes at the World's Fair, and naturally expect a larger demand and better prices for their wines when they once become better known and appreciated.

Whenever the reaction sets in (and some signs are perceptible that a change in the market is near at hand) our wines will command prices which will encourage the grower to replant with resistant vines his hil vineyards which the phylloxera has destroyed. The necessity of protecting or renewing them has prompted the vine growers to look into the possibilities of how best to save or replant these vineyards. A committee of vine growers, headed by Mr. E. P. Palmer, has obtained very valuable information about the different vines and soils, and grafting best adapted for them; and I can only repeat here what I have stated in my former reports, and always urged in the meetings of our Commission: that the vine growers should be entitled to an earnest support from our Commission in their fight against this terrible disease I hope that the recently manifested disposition of our Board to act in the matter will soon take a positive form; and I would recommend most earnestly the establishing of experimental stations in different localities, and thereby save the vine growers costly experiences in making the experiments.

Through the courtesy of Collector Byington, of the Fourth District I received the following official figures on the manufacture of brandy and sweet wines in Napa and Solano Counties during the last two fiscal years:

BRANDY PRODUCTION.

Napa County.

By 32 registered distilleries, from May 1, 1890, to April 30, 1891	205,093 gallons
By 31 registered distilleries, from May 1, 1891, to April 30, 1892	275,705 gallons
Increase last year	70,612 gallons

Solano County.

By 6 registered distilleries, from May 1, 1890, to April 30, 1891	4,781 gallons
By 5 registered distilleries, from May 1, 1891, to April 30, 1892	28,744 gallons
Increase last year	23,963 gallons

SWEET WINES.

Napa County.

From August 1, 1890, to April 30, 1891	131,651 gallons
From August 1, 1891, to April 30, 1892	148,203 gallons
Increase last year	16,552 gallons

Solano County.

From August 1, 1890, to April 30, 1891	None.
From August 1, 1891, to April 30, 1892	72,399 gallons
Increase last year	72,399 gallons

Through the courtesy of Collector Quinn, of the First District, I learn that in Contra Costa County five registered distilleries produced the following amount of brandy:

In 1890	3,996.73 gallons.
In 1891	11,178.86 gallons.
In 1892	4,053.87 gallons.

Respectfully yours,

E. C. PRIBER.

REPORT OF F. A. WEST,

ON THE POSSIBLE SALE OF BRANDY AND CONCENTRATED MUST TO EASTERN WINE MAKERS.

STOCKTON, December 10, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: After the revision of the sweet wine regulations was com pleted in Washington last June, I visited, in accordance with you instructions, the principal wine-growing districts of New York and Ohi with a view of investigating the possibilities of opening a market fo California brandies to be used in fortifying sweet wines free of tax, and regret to say that from the information gained in personal interview with the wine growers, and in correspondence since my return from th East, there would seem to be no prospect of opening such a marke unless the methods of manufacture employed in the East be change There is a very large amount of sweet Catawba manufactured in Ne York and Ohio, and also a considerable quantity of Port. These wine are clean, sound, and wholesome, but owing to the fact that some can sugar is used in their manufacture, they cannot be classified as "pur sweet wines," as defined in the Sweet Wine law, and are consequentl not eligible for fortification with grape spirits free of tax. It woul seem that the Eastern growers could avail themselves of the law by fe menting the pure juice of the grape as low as possible under the lav then adding the extreme limit of spirits, withdrawing from the fortify ing-room and sweetening with cane sugar or concentrated must, a preferred. Whether or not this would produce as good a wine as is pro duced now by the New York and Ohio growers I do not know, but I ca see superficially no objection to such a course, and I can see no reaso why such a method of manufacture could not be profitably adopted.

In any event, these wines will continue to be made and fortified wit grain spirits, and the market will not be open to California until som change is made in the methods of operation. Under the present law th use of condensed must, *unless produced by the party who offers the sam for fortification*, is precluded. Hence, this market is also shut ou although I believe many of the Eastern growers would use Californi condensed must if it were properly presented to them. Several me informed me that they had made satisfactory experiments with sam ples, but had not taken much interest in the matter because they wer doing very well as they were. There is a very general opinion amon all the Eastern growers that a concerted move should be made by th California and Eastern men against the adulteraters in large citie The use of cane sugar in a limited amount by the legitimate win growers of the East, cannot be considered in any sense an adulteratio because their wines are as pure as ours, and we Californians would fin in the Eastern growers our strongest allies against our worst foes, an would find them ready at any time to unite with us in any measu which would lead to this end.

Respectfully submitted. FRANK A. WEST.

REPORT OF WILLIAM C. SPENCER,

ON THE USE OF ALTERNATING ELECTRICAL CURRENTS IN THE TREATMENT OF WINES.

San Francisco, June 5, 1891.

Mr. Clarence J. Wetmore, *Manager Experimental Cellar, Board of State Viticultural Commissioners, San Francisco:*

Dear Sir: I herewith desire to report on the experiments which have been carried on under your supervision in your cellar since May 5, 1891, relating to the application of the alternating electric current for the purpose of clarifying and sterilizing wines. My first experiments date back to July, 1890; but at the beginning of this year I received information from France which proved that experiments of the same nature, involving the same principle, had been carried on in Burgundy and Bordeaux with results worthy of note, and confirming ours. Trying to obtain information, to avoid useless and expensive experiments, from the inventor, Mr. M. de Meritens, a distinguished electrician in Paris, I received a reply, in which he stated that he had as yet made nothing public on this subject.

The apparatus necessary for applying this process consists of:

I. A source of electricity (alternating).

II. A receptacle for holding and treating the wine, preferably made of a non-conducting material of even diameter, and lined with two suitable electrodes at each end on the inside of said receptacle.

III. Suitable devices for carrying the "alternating electric current" from its source to the electrodes.

With such an arrangement, the wine under treatment is acting as a conductor of electricity, and forms part of the circuit. Having been obliged to adapt myself to existing conditions, and no alternating current being at hand, I devised a small apparatus for converting the direct current (which is in use at 317 Pine Street for lighting the building) into an alternating current, with the special advantage of making it possible to have alternations from two up to any number of thousands per minute.

The rate of alternations in the following experiments was 2,000 per minute; the electro motive force about 75 volts; the current from two to three ampères; the quantity of wine, 10 gallons, contained in a ten-gallon barrel, the two heads of which were lined with carbon on the inside, connecting with the outside by means of ordinary binding posts, to which were attached the wires conveying the alternating current.

There is absolutely nothing secret nor patented about this process, and I hold myself ready to give such information as will be of use.

May 5th—Sweet Sauterne 4½ hours, marked No. 1.....Acidity measured May 27th, $4\frac{80}{100}$.
May 6th—Sweet Sauterne 9 hours, marked No. 2.May 26th destroyed with direct current.
May 8th—Sweet Sauterne 9½ hours, marked No. 3.....Acidity measured May 27th, $4\frac{80}{100}$.
Original—Sweet Sauterne No. 0 ....Acidity measured May 27th, $5\frac{25}{100}$.
(Packages marked Nos. 1, 2, 3, 0, were opened eight different times to take samples.)
Original—Sweet Sauterne (never opened but once).....Acidity measured May 27th, $4\frac{80}{100}$.

May 12th—White wine 9 hours, marked AH1................Acidity measured May 27th
May 14th—White wine 15 hours, marked AH2..........Acidity measured May 27th, 7[illegible]
May 18th—White wine 10½ hours, marked AH3.......Acidity measured May 27th, 6[illegible]
Original—Marked AH0................................Acidity measured May 27th, 7[illegible]
(Packages marked AH1, AH2, AH3, AH0, were opened five different times to ta
samples. Wine undrinkable.)
May 23d—Claret 9 hours, marked No. 1 (no original for comparison) ....
....Acidity measured June 4th, 6[illegible]
June 3d—Claret 7 hours, marked No. 2.................Acidity measured June 4th, 6[illegible]
Original—Claret marked No. 0...........................Acidity measured June 4th, 6[illegible]

I desire to state that the work carried on has been of the most prim tive kind, for want of electrical apparatus and other accessories, and a confident that when the properties of this process are thoroughly unde stood and properly applied it will be of great benefit for clarifyin destroying ferments, and even aging California wines.

I wish to extend my thanks to the Commission for the courtesy an assistance given me while carrying on these experiments, and in pa ticular to Mr. Chas. A. Wetmore, who has furnished the wine operate on.

Respectfully submitted.

WILLIAM C. SPENCER.

PROGRESS REPORTS OF WINFIELD SCOTT, SECRETARY.

FIRST REPORT.

Read at the meeting of the Board held June 8, 1891.

SAN FRANCISCO, June 8, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I beg leave to submit my first annual report as your Secretary. The routine business of this office has increased to a very considerable extent since the first of last July, at which time I entered upon the position. The correspondence has more than doubled in volume, and now extends to every country where the grape is cultivated. This has been carefully attended to, as has all the other routine business pertaining to the office.

Several special inquiries and works have also been carried out. The first special work was the preparation of the last annual report, and at the same time a table of tariffs for all the civilized countries of the world was hastily compiled and added to the report as an appendix. When the report of the Commission was published the copies were distributed in the ordinary manner, entailing a labor of itself of some weeks.

In the meantime the Executive Committee had authorized the compilation of a new Directory of the Grape Growers and Wine Makers of the State. While this work did not immediately devolve upon me, all the county reports as filed had to be rewritten and the names arranged alphabetically for publication. At the request of one of the Commissioners, the compilation of one district was turned over to Mr. Clarence J. Wetmore and myself, and this was attended to under our immediate supervision. I am happy to state that though there have been many unforeseen and unavoidable delays in the compilation of this Directory, it is now ready for publication, and awaits the approval of the Board of Examiners before being sent to the State Printer.

Supplementary to this will be published a partially complete directory of the grape growers and wine makers east of the Rocky Mountains. This has been collected entirely by correspondence, and includes about 3,000 names, each with Post Office address, acreage, and whether each man is a wine maker or not, forming an invaluable supplement to our California list. This work has been conducted entirely by myself.

While thus engaged, I set about collecting a mass of material which may be of use at a later date in the preparation of a work on distillation. Everything which could bear upon the manufacture of fruit brandy has been preserved as collected, and the material will be of value should the Commission decide upon publishing such a work as I shall propose.

I have also made a complete collection of the Pure Wine laws of the various States and Territories, or of the anti-adulteration laws bearing on the sale of adulterated liquors. Wherever possible I have secured

copies of all State laws bearing on the liquor problem, merely as a mat ter of reference. The same course will shortly be pursued with the citie and towns of California, in all of which the license question is dail becoming of more importance, and constantly affects to a greater degre the interests of the wine trade and producers.

The publications of the Commission are in constant demand. On demand, however, which we have not yet met is in supplying some reli able printed work on the distillation of brandy. This is the greates need of the Commission, so far as printed matter for distribution i concerned.

I would most earnestly recommend that the Commission undertak the publication of a book on brandy distillation, and distribute it at th earliest possible moment. The subject is one of growing importanc and the relative importance of the brandy to the wine interest is yearl augmenting in favor of the brandy. The work should be begun at once our literature being thus far singularly deficient in this branch of th industry.

Anticipating a trifle on the action of the Commission, I have partiall completed the translation of the latest German work on distillation which was first examined and pronounced well worth translation an publication by Commissioner Priber. This book I can translate an place before the one who is intrusted with preparing the Commission' publication. As an instance of the interest felt in brandy production, desire to state that when this book was announced, and before its merit were known in this Commission, I had, in another connection, betwee forty and fifty inquiries as to where it could be procured.

Mr. W. H. McNeil, the Clerk, has continued the scrap-books begu some years ago, and added greatly to their value during the past yea He has rendered me constant and valuable assistance in other work.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

SECOND REPORT.

Read at the meeting of the Board held December 18, 1891.

SAN FRANCISCO, December 14, 1891.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I beg leave to submit my semi-annual report to you body.

Since the last meeting of the Board the routine business of the offic has been attended to with all reasonable promptness. The annual repor of the Commission for 1890 has been received from the State Printer, a well as the new Directory of the Grape Growers and Wine Makers o California and the East, and both have been distributed.

The library has been re-catalogued, and is now, for the first time i three years, in good working shape. Several valuable additions hav been made by purchase and gift, the most notable addition, probabl being the "Ampelographie Française," by Victor Rendu. There hav been additions of many French and German works, and more are soo to arrive.

I herewith submit the correspondence in relation to the Indefinite Bonding Period bill, which is now in shape to be introduced at the present session of Congress, and which will soon be introduced by Representative McKenna. The bill is approved by the leading representatives of the legitimate whisky and rum distillers, and will have their hearty support. For reasons which are not necessary to state here, the correspondence was carried on by me in another capacity. All of the correspondence, however, is at the service of the Board.

I respectfully ask that at this meeting appropriate resolutions be passed, to be sent to Washington for use there. I have already been promised the support of all the leading commercial bodies of the State, and there should be some appropriate action taken by the San Francisco Wine Dealers' Association.

The publication of a book on the distillation of brandy is one of the certainties of the near future. There are to be chapters on the history of distillation in California, which I am now preparing, with the assistance of Messrs. DeTurk, West, and Haraszthy, with appropriate statistics from its infancy; chapters on the best varieties of grapes for the manufacture of brandy, and on the stills used in the State; a chapter on the possible foreign markets in Germany and England, by Edward Walden, Jr., who is known by name at least to the members of the Board, and who has kindly consented to give the producers of the State the results of the efforts of his house to introduce brandy into the foreign markets; chapters on distillation in France, by Charles A. Wetmore, being portions of his letters from Cognac and Jarnac many years ago, with a running set of notes and observations, which will embody his experience since then; and the whole will conclude with a translation of Antonio dal Piaz's work on brandy distillation, which has already been submitted to Commissioners West and Priber, and pronounced a most valuable work. The complete work will be ready to go to the State Printer, from present indications, about the first of the year.

The translation of a work by Antonio dal Piaz, on "The Utilization of Wine Residues," will be begun as soon as the book can be obtained from abroad. Especial reference will be paid to that part relating to the manufacture of cream of tartar. This will be published supplementary to the treatise on the same subject now under preparation by Professor Rising.

I have also under way the translation of Valery Mayet's "Les Insectes de la Vigne," which is said to be the most complete and practical work of the sort yet published. It is pronounced a most valuable book for the grape growers.

The statistics of wine shipments and production are kept accurately, I attending in person to this duty. I have been relieved, as before, from the duty of maintaining the scrap-books, etc., through the kindness of Mr. William H. McNeil.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

THIRD REPORT.

Read at the meeting of the Board held June 13, 1892.

SAN FRANCISCO, June 13, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: My annual report will be short, much of the work of the year having been covered in the semi-annual report which was submitted to you at the last meeting, in December, 1891.

The regular work of the office has been carried on as usual, and has been heavier than I have ever known it before. I have had some assistance in this matter from Mr. McNeil, and some from outside sources, and everything about the office is in splendid working condition. All of the valuable viticultural matter which has been collected in past years in the scrap-books has been indexed, and is now easily available for reference. Much time has been spent on the statistics of production and export of wine and brandy, and this feature of the office work has been most carefully attended to.

During the past half year the work on brandy distillation has been prepared for publication, published, and distributed. I do not need to state how well it has been received by the wine makers and distillers; that is already known to you.

In the latter part of May there was held the Viticultural Convention, the proceedings of which are now ready for publication. These will form part of our next annual report, which will be made up, as far as known, as follows:

Report of the President, with statistics.

Reports of Commissioners.

Report of Chief Executive Officer Wetmore.

Report of Secretary Scott.

Report of William C. Spencer on the use of alternating currents in treating wine.

And the several appendices.

It will be noticed by reference to Professor Rising's report that his work on cream of tartar making will soon be ready. Everything else on the list is ready for publication, with the single exception of the reports of Commissioners. I am informed that all of our report must be at the State Printer's not later than July 1st to insure publication within a reasonable time before January, 1893, and for this reason these reports should be forthcoming as early as possible.

I am still engaged in the translation of Valery Mayet's work, "Les Insectes de la Vigne," but progress is slow on account of press of other matters.

I would most respectfully call your attention to the Raines bill, just introduced into Congress, a copy of which is herewith given, and which appears to call for definite action by this Board:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of sections forty-two, forty-three, forty-four, forty-five, forty-six, forty-seven, forty-eight, and forty-nine of the Act entitled "An Act to reduce the revenue and equalize duties on imports, and for other purposes," approved October first, eighteen hundred and ninety, shall, on and after the first day of August, eighteen hundred and ninety-two, be so extended that any producer of sweet wines, as defined in said Act, may, under such regulations and official supervision, and upon the execution of such entries and the giving of such bonds, bills of lading, and other security

as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, withdraw distilled spirits from any distillery warehouse or special bonded warehouse, free of tax, in original packages, in any quantity not less than eighty wine gallons, and may use so much of the same as may be required by him, under such regulations, and after the filing of such notices and bonds, and the keeping of such records, and the rendition of such reports as to materials and products, and the disposition of the same, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, in fortifying the pure sweet wines made by him, and for no other purpose, in accordance with the limitations and provisions as to uses, amount to be used, and period for using the same, set forth in section forty-two of said Act, and as to the place for using the same, the provision under which it shall be used, and the affixing of stamps, as set forth in section forty-five of said Act; *provided,* that such sweet wine may, before the addition of such spirits, contain less than four per centum of saccharine matter; *and provided,* that pure sugar, as well as distilled spirits, may be added to the wine under the immediate supervision of the officer assigned to supervise the fortification of the wine, and that the quantity of spirits added shall not be limited, as provided by section forty-two of said Act, to the quantity necessary for the preservation of the saccharine matter contained in the wine, unless such quantity shall be in excess of the fourteen per centum and twenty-four per centum limitations fixed by said section.

This is a matter which it seems to me calls for immediate action, and I ask for your authority to take such steps in reference to this bill as you may see fit.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

MINUTES OF THE BOARD.

SAN FRANCISCO, December 9, 1890.

Minutes of the regular meeting of the Board of State Viticultur Commissioners, held at the office, 317 Pine Street. at 11 A. M.:

The following Commissioners were present: West, Doyle, Bundsch Blanchard, and President De Turk. The Secretary being absent o account of illness, Mr. C. J. Wetmore was appointed Secretary pro ter

The minutes of the previous meeting were read. Mr. Bundsch asked that the minutes be corrected so as to show that when his nam was proposed for President, he withdrew. The correction was ordere and the minutes were approved.

The monthly report of Mr. Dowlen was then read and ordered plac on file.

Mr. Doyle then offered the following resolutions, which were adopte

Resolved, That the services of Ethelbert Dowlen be dispensed with after the concl sion of his current month of service, and that the Secretary inform him that after th time his services will not be required by this Commission. The Secretary is al directed to make the same communication to Commissioner Shorb.

Resolved, That the Executive Committee be authorized, if they are of the opini that Mr. Dowlen's services should be continued for a brief period, to enable him to clo pending work, to arrange with him for that purpose.

Chief Executive Officer Wetmore then made the following recor mendations:

First—That the influence of the vine growers should be exerted in municipal a county organizations to cause a practical discrimination to be made between licens imposed upon public places devoted mainly or wholly to sales of liquors by the gla and stores, groceries, restaurants, and hotels, where no saloons are maintained; and th the vine growers should demand that where their products are sold under ordinary tra methods in places where no consumption is permitted on the premises, no license t should be imposed other than such as is imposed on other classes of merchandise.

Second—That immediate steps should be taken to perfect a system of exhibiting o viticultural products, after the general plan of the exhibit in San Francisco, in the pri cipal cities east of the Rocky Mountains, and especially in the city of New York.

The recommendations were referred to the Executive Committee, wi power to act.

The selection of a Chief Executive Officer then came up. Mr. We more stated that if the members of the Board had any one in view f the place, he was willing to resign; or if they wished him to keep t office, he would do so without pay.

Mr. Blanchard then offered the following resolution, which w adopted:

Resolved, That Mr. Charles A. Wetmore be continued as Chief Executive Officer of t Commission; but, at his own suggestion, without a salary, leaving the compensation be paid for any services hereafter performed by him, and for which compensation shou be paid, to be fixed by the Board.

The meeting then took a recess until 2 P. M.

On reassembling at 2 P. M., Commissioner Stephens was present, well as those present in the morning.

The minutes of the meeting of the Executive Committee held since he last regular meeting were read, and the actions taken by the comittee were approved.

Mr. Doyle then offered the following resolution, which was adopted:

Resolved, That Messrs. George West, J. DeBarth Shorb, and I. DeTurk be a special comittee to study the question of treasury regulations under the recent Sweet Wine regution of Congress; that they be directed to associate with themselves persons practically ngaged in the manufacture of fortified wine, and with their assistance present their ews to the revenue and treasury authorities as those of this Commission.

Mr. West called attention to the report that the Distillers' Trust was ndeavoring to fight the Sweet Wine bill in Congress. On motion, the hief Executive Officer was instructed to take such action in the matter s he thought best.

The meeting then adjourned.

C. J. WETMORE,
Secretary pro tem.

SAN FRANCISCO, June 8, 1891.

Minutes of the annual meeting of the Board of State Viticultural ommissioners, held at the rooms, 317 Pine Street, at 11 A. M.

The meeting was called to order by President I. DeTurk.

Present: President DeTurk, Commissioners Doyle, West, Priber, Bundhu, and Blanchard, also Chief Executive Officer Wetmore, Manager . J. Wetmore, and the Secretary.

The minutes of the meeting of December 9, 1890, were read, corrected, nd approved.

The minutes of the meetings of the Executive Committee from Decemr 9, 1890, until June 8, 1891, were read, and the following resolution fered by Mr. Blanchard and seconded by Mr. Bundschu was adopted:

Resolved, That the action of the Executive Committee from December 9, 1890, to June 8, 91, be approved as recorded in the minutes.

Chief Executive Officer C. A. Wetmore presented his annual report,* nd supplementary to it his analysis of the Sweet Wine law. On otion of Mr. Doyle the same was received and placed on file, and the ecretary was instructed to prepare the same for immediate publication the State Printer, and also furnish copies to the newspapers.

Mr. Doyle then offered the following resolution, which was duly seced, designed to carry out the recommendations of the Chief Executive fficer relative to the use of concentrated and boiled must and highoof brandy by the Eastern sweet wine makers:

Resolved, That the Chief Executive Officer be directed to prepare at once a circular inting out to Eastern wine makers the advantages of using concentrated must and gh-proof brandy for their purposes in preference to glucose, spirits, and other inferior aterials, and that the same be published and widely disseminated among Eastern wine akers.

The resolution was unanimously adopted.

Manager C. J. Wetmore then presented his annual report* and financial statement, both of which were received and ordered placed on file.

On motion of Commissioner Doyle, seconded by Commissioner Blanchrd, Mr. William C. Spencer was employed, at a salary of $60 per month,

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*This will be found in the regular reports of the officers, printed elsewhere.

to continue the experiments on wine with the alternating electr
current, and report on the same to the Board.

Recess was taken until 2 P. M.

On re-convening, Commissioner Doyle was absent, but as a quoru
was in attendance, the business was proceeded with.

The annual report* of Secretary Scott was read and placed on file.
supplementary report was made by the Secretary, verbally, relative
the policy of the Board on the proposed Indefinite Bonding bill.

On motion of Commissioner Priber, seconded by Commissioner Wes
the Secretary was directed to use the influence of the Commission, ar
direct his own efforts in favor of an indefinite bonding period for branc
and whisky.

On motion of Commissioner West, seconded by Commissioner Blancl
ard, the following resolution was adopted:

Resolved, That the Chief Executive Officer be and he is hereby directed to begin
once the preparation of a thorough and exhaustive work on brandy, and that the sar
be published at the earliest possible day.

Commissioner Bundschu made a statement to the effect that the Inte
state Commerce Commission would meet in San Francisco in the cour
of a few days, and that the Commission should take action looking to
further reduction on overland rates on wine and brandy, and especial
on return packages.

A general discussion followed, every one warmly commending tl
suggestion, and, on motion of Commissioner Blanchard, seconded l
Commissioner Priber, Commissioner Bundschu and the Secretary we
appointed a special committee of two to prepare a memorial on tl
subject and lay it before the Interstate Commission.

The further management of the Anaheim disease investigation w
brought up by the Secretary, and after an informal talk it was decid
that all matters and communications pertaining to the subject shou
be referred to Commissioner Shorb.

The communication of the United States Department of Agricultu
asking for a report on wine and brandy adulteration, was, on motion
Commissioner West, referred to Prof. W. B. Rising, the State Analy
for a separate report.

A communication was read from the City Board of Trade, relative
the entertainment of Warner Miller, President of the Nicaragua Car
Co., while he was in the city. President DeTurk appointed C.
Wetmore to represent the Commission in the matter.

The election of officers was then declared in order, and before a
nominations were called, the following letter was read:

SAN FRANCISCO, June 8, 189

To the Board of State Viticultural Commissioners:

GENTLEMEN: At your meeting to be held to-day, the election of officers for the ensu
year will require action on my office. Permit me to withdraw any supposed candid
for reëlection should such be contemplated.

With sincere appreciation of the uniform courtesy with which I have been treatec
the past, and grateful acknowledgments of the honors that have been conferred on
I desire to sever my official connection with the Commission, trusting that in
future its work will be as valuable to the public, and even more so, than it has beer
the past.

Respectfully,

CHAS. A. WETMORE,
Chief Executive Office

*This will be found in the regular reports of the officers, printed elsewhere.

Nominations for President were then declared in order. Mr. West nominated Mr. Shorb. Mr. Priber renominated Mr. DeTurk. Mr. De Turk withdrew in favor of Mr. Shorb, and on motion of Mr. Blanchard the rules were suspended, and a unanimous ballot was ordered cast for Mr. Shorb.

Nominations for Vice-President were declared in order. Mr. Blanchard nominated Mr. West, and, on motion, the Secretary was ordered to cast a unanimous ballot for Mr. West.

Nominations for Treasurer were declared in order. Mr. Priber renominated Mr. Doyle. On motion of Mr. Blanchard, the rules were suspended and a unanimous ballot ordered cast for Mr. Doyle.

Nominations for Secretary were declared in order. Mr. West renominated Mr. Scott. On motion of Mr. Blanchard, the rules were suspended, and the President instructed to cast a unanimous ballot for Mr. Scott.

Nominations for Chief Executive Officer were declared in order. Mr. West nominated Mr. C. J. Wetmore, and on motion of Mr. Blanchard, the rules were suspended, and the Secretary was instructed to cast a unanimous ballot for Mr. Wetmore.

On motion of Mr. Bundschu, duly seconded, the office of Manager of the Hall and Experimental Cellar was abolished.

Mr. Blanchard offered the following resolution, which was unanimously adopted:

Resolved, That the thanks of this Commission be and the same are hereby tendered to DeTurk, our outgoing President, for his able, impartial, and gentlemanly conduct in presiding over this Commission in the past, and that we realize the fact that he has been and is an indispensable factor in the efficiency of this Commission.

Mr. Blanchard then offered the following resolution, which was adopted unanimously:

Resolved, That this Commission fully realizes and appreciates the valuable and indispensable services of Mr. Charles A. Wetmore, our outgoing Chief Executive Officer, and, as some acknowledgment and recognition of his value to us, we hereby tender to him our thanks, and acknowledge ourselves, and the State, through us, under lasting obligations to him.

On motion of Mr. Priber, seconded by Mr. Blanchard, Mr. C. A. Wetmore was voted his salary as Chief Executive Officer for the past half year.

Adjourned.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, June 15, 1891.

The following communication was received this day:

SAN GABRIEL, CAL., July 12, 1891.

Mr. WINFIELD SCOTT, *Secretary Board of State Viticultural Commissioners, San Francisco:*

DEAR SIR: I hereby appoint Commissioner George West of the San Joaquin District, Isaac DeTurk of the Sonoma District, and G. G. Blanchard of the El Dorado District as the Executive Committee, and Commissioner Charles Bundschu of the San Francisco District as Auditing Committee of the Board of State Viticultural Commissioners.

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Very respectfully yours,

(Signed:) J. DEBARTH SHORB,
President.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, June 22, 1891.

The following communication was received this day:

SAN GABRIEL, CAL., June 18, 1891.

Mr. WINFIELD SCOTT, *Secretary Board of State Viticultural Commissioners, San Francisco*

DEAR SIR: I beg to submit the names of the honorable Commissioners as members the standing committees of this Board, in addition to those already named on t Executive and Auditing Committees:

Finance—Commissioners Rose, Doyle, and Priber.
Vine Pests, etc.—Commissioners West, Priber, and DeTurk.
Distillation, etc.—Commissioners DeTurk, West, and Bundschu.
Table Grapes—Commissioners Stephens, West, and Rose.
Experimental Cellar—Commissioners Priber, Bundschu, and Doyle.
Anaheim Disease (by request)—Commissioner Shorb.
World's Fair—Commissioners Doyle, Priber, Blanchard, DeTurk, and Stephens.

Very truly yours,

(Signed:) J. DEBARTH SHORB,
President.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, December 14, 1891.

Minutes of the meeting of the Board of State Viticultural Commi sioners, held at the office of the Board, 317 Pine Street.

In the absence of President J. DeBarth Shorb, the meeting was call to order by Vice-President George West.

Present: Commissioners West, Doyle, DeTurk, Stephens, and Pribe

The death of Hon. George G. Blanchard, Commissioner for El Dora District, was announced, and on motion of Commissioner Doyle, t following resolution was adopted:

Resolved, That we have learned with deep regret the death of Commissioner George Blanchard, a member of this Board from its inception; that the Secretary be directed express to the family of the deceased our sympathy with them, and our sense of the l which the public has sustained in the decease of a most useful and devoted public offic and that out of respect for his memory the Commission do now adjourn until Thursd the 17th instant, at 11 A. M.

Adjourned.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, December 17, 1891.

Minutes of the meeting of the Board of State Viticultural Commi sioners, held at the office of the Board, 317 Pine Street, at 11 A. M.

Present: Commissioners West and Priber.

No quorum being present, the Board adjourned until Friday, Decer ber 18th, at 11 A. M.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, December 18, 1891.

Minutes of the meeting of the Board of State Viticultural Commi sioners, held at the office of the Board, 317 Pine Street, at 11 A. M.

Present: Commissioners West, DeTurk, Doyle, and Priber.

No quorum being present, the Board adjourned to the call of t Chair.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, January 14, 1892.

Copy of telegram received this day from Hon. J. DeBarth Shorb, resident of the Commission:

SAN GABRIEL, CAL., January 14, 1892.

r. WINFIELD SCOTT, *Secretary Board of State Viticultural Commissioners, San Francisco:*

I hereby appoint Commissioner Chas. Bundschu as member of Executive Committee, ce Blanchard, deceased.

(Signed:) J. DEBARTH SHORB,
President.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, June 13, 1892.

Minutes of the meeting of the Board of State Viticultural Commis- oners, held at the office of the Board, 317 Pine Street, at 11 A. M.

Present: Commissioners West, DeTurk, Towle, Bichowsky, Priber, undschu, and Doyle. Absent: President Shorb and Commissioner ephens.

Vice-President West presided.

The minutes of the December meetings were read and approved.

The minutes of the meetings of the Executive Committee held since e December, 1891, meeting, were read and approved.

The semi-annual report* of Chief Executive Officer C. J. Wetmore s read and placed on file.

Regarding the suggestion that the Viticultural Café be discontinued, nich appeared in Mr. Wetmore's report, considerable discussion sued. Mr. Doyle favored continuing the café, and others were for opping this feature of the work of the Commission. It was stated at the present lease would run until July 1, 1893. Finally, on motion Mr. Bundschu, the Chief Executive Officer was instructed to ascer- in from Mr. James G. Fair's agent whether he would be able or willing cancel the lease before that time; further action was left with the xecutive Committee.

The progress report* of Prof. W. B. Rising, who is investigating cream tartar making, was received and placed on file.

The report* of Secretary Scott was received and placed on file.

On motion of Commissioner Bundschu, the Secretary was instructed prepare a new schedule of the tariff of the countries of the world, to published in the next annual report.

Regarding the bill of Congressman Raines to amend the Sweet Wine w, after a thorough discussion, it was resolved to prepare a telegram be sent to Senator Felton and the California delegation in Congress, otesting against the bill.

Recess was then taken till 2 P. M.

On reassembling the following telegram was reported by the Secretary, d was ordered sent immediately to Washington:

SAN FRANCISCO, June 13, 1892.

n. C. N. Felton, U. S. Senate; Hon. T. J. Geary, Hon. A. Caminetti, Hon. John T. Cutting, Hon. E. F. Loud, Hon. W. W. Bowers, House of Representatives—California Delegation in Congress, Washington, D. C.:

The Board of State Viticultural Commissioners, at the annual meeting held to-day, s learned that a bill has been introduced by Congressman Raines, and is now pend- g in the House, to amend Sections 42 to 49 of the Revenue Act of October 1, 1890.

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*These will be found in the regular reports of officers, printed elsewhere.

This is that part of the McKinley bill usually called the Sweet Wine law. The Raines amendment permits the use of corn or other spirits for fortification, permits the fortification of dry wine, and the addition of sugar. The effect of this bill, if passed, will be destructive to the viticultural interests, and open the door to the manufacture of fraudulent wine and endless stretching of wines. Every effort of the delegation should be exerted to resist its passage. Letter to follow.

(Signed:)

GEORGE WEST,
President.
WINFIELD SCOTT,
Secretary.

The semi-annual report* of William H. McNeil, Cashier and Storekeeper, was received and placed on file.

Election of officers was then declared in order. A letter was first read from Mr. Shorb declining reëlection as President, on the ground of ill health, and thanking the Commissioners for their many acts of courtesy in the past. The Secretary was directed to prepare a suitable answer to Mr. Shorb's letter.

Nominations for President were declared in order. Mr. Priber nominated George West. There being no other nominations, the Secretary was instructed to cast the unanimous ballot for Mr. West.

Nominations for Vice-President were declared in order. Mr. DeTurk nominated Chas. Bundschu. There being no other nominations, the Secretary was instructed to cast the unanimous ballot for Mr. Bundschu.

Nominations for Treasurer were declared in order, and the names of Mr. Doyle and Mr. Priber were presented. Both declined, and a ballot was taken which resulted: Doyle, three; Priber, three. Both again declined, and presented the name of Mr. Towle. On motion, the rules were suspended, and the Secretary was instructed to cast a unanimous ballot for Mr. Towle.

For Secretary, the name of Mr. Scott was presented. On motion of Mr. DeTurk, a unanimous ballot was cast by the Commission for Mr. Scott.

For Chief Executive Officer, Mr. Bundschu nominated Mr. C. J. Wetmore, and, on motion, the Secretary was instructed to cast a unanimous ballot for Mr. Wetmore.

The matter of planting experimental plots of resistant stocks in various sections of the State was brought up. It was deemed best that this should be done, so that hitherto untried varieties and hybrids could be tried and tested. On motion of Mr. Doyle, the Chief Executive Officer was authorized, in conjunction with the Executive Committee, to take such steps in the matter as were deemed proper.

President West announced the following standing committees:

Executive—Bundschu, Priber, and DeTurk.
Auditing—DeTurk.
Finance—Shorb, Towle, and Doyle.
Vine Pests, etc.—Bichowsky, Priber, and Stephens.
Distillation, etc.—DeTurk, Shorb, and Priber.
Table Grapes, etc.—Stephens, Towle, and Doyle.
Experimental Cellar—Doyle, Priber, and Bundschu.
Anaheim Disease—Shorb and Bichowsky.
World's Fair—DeTurk, Stephens, Bundschu, Bichowsky, and Shorb.

WINFIELD SCOTT,
Secretary.

*This will be found in the regular reports of officers, printed elsewhere.

APPENDICES.

[APPENDIX A IS BOUND SEPARATELY.]

APPENDIX B.

TRANSACTIONS OF THE EIGHTH ANNUAL VITICULTURAL CONVENTION.

HELD AT IRVING HALL, SAN FRANCISCO, MAY 18 AND 19, 1892.

TRANSACTIONS OF THE EIGHTH ANNUAL VITICULTURAL CONVENTION.

The World's Fair Viticultural Convention was called by Clarence J. Wetmore, Esq., Chief Executive Viticultural Officer, in accordance with a resolution passed at a meeting of the Executive Committee of the State Viticultural Commission. It was held at Irving Hall, No. 139 Post Street, San Francisco, on May 18th and 19th. The purpose was to bring together all persons interested in all branches of viticulture, so that some definite plan might be adopted for making a grand viticultural exhibit at the World's Columbian Exposition.

FIRST DAY'S PROCEEDINGS.

San Francisco, May 18, 1892.

In the absence of President J. DeBarth Shorb of the Commission, I. DeTurk, Esq., acted as Chairman, and Winfield Scott, Esq., acted as Secretary.

The Chairman called the meeting to order, stating the objects of the meeting, and then introduced M. H. DeYoung, Esq., World's Fair Commissioner from California.

M. H. DeYoung: Mr. Chairman and gentlemen, I received an invitation from your Secretary to come before you and give you some idea of the World's Exposition, to be held in Chicago in 1893. In treating this subject we will take it up in three branches: the object, the scope, and the benefits to be derived.

Strange as it may seem, there have been only eight International Expositions held in the history of the world. The first one was held in London in 1851, and was the idea or creation of the Prince Consort, the husband of Queen Victoria. Compared with modern or recent date Expositions it was a small affair. The entire Exposition held in 1851 could be placed in one of the buildings of the contemplated Chicago Exposition. The total number of exhibitors was only seventeen thousand, while in Chicago we assume there will be between sixty and seventy thousand.

All the World's Fairs, even when they have not proved pecuniary successes, have greatly promoted industry in the countries in which they have been held. The object is to increase the old and open up new avenues of employment, and they thus greatly add to the wealth of the nation in which the Exposition has been held. The effect of our Centennial Exposition in Philadelphia was very marked. Shortly after 1876 great improvements were made in many departments of manufacture, and entirely new industries were started in this country. The most noticeable thing in this connection was the impetus given to the manufacture of artistic articles. Prior to 1876, we, as a rule, made only the commoner varieties of articles. After 1876 our artisans, seeing how

much ahead of us other nations were in elegance of finish and artist design, profited by the example, and now we are in many lines rivalin the best manufactures of the Old World. It is not only the materi benefits that flow from Expositions that benefit a nation. They a great educators. They bring within the reach of many that broad an liberal education which some of our greatest authors have said can onl be obtained by travel. International exhibitions bring the whole wor to us. Instead of compelling us to travel over the whole world to see i best features, they come to us in a compact form, so that a busy ma may see in a few days more than he could in years of travel.

A World's Fair teaches the people of the country in which it is he what their real resources are. Naturally the home country puts fort its best efforts; it shows what can be done in every line of industry an in arts and sciences, and the visitor is thus enabled to gather and abso information which the perusal of a library of statistical volumes cou not furnish him.

A World's Fair inspires the respect of rival nations. A country lil the United States, pursuing a policy of peace, is apt to be underrat by the people whose attention is called only to rival nations upon a w basis. It is only on an occasion such as we are about entering up that attention is drawn to our capabilities, and our critics are broug to a realization of the fact that though peaceful, we may, like the slu bering lion, be awakened.

We need not fear comparison with previous World's Fairs. As a those of the world were eclipsed by the World's Fair of Paris, in 188 so will that of Chicago eclipse all others in 1893.

Now let us get some idea of the extraordinary scope of the Chica Exposition in comparison with others. I will give you some compa sons, taking the Exposition of 1889 in the departments which we greatest, and based on that you can form an idea of what an immens startling, and wonderful Exposition the one in Chicago will be.

The Paris Exposition covered 96 acres of ground; the one in Chica in the main park alone covers 633 acres of ground, and the Midwa Plaisance, as it is called, will add 200 acres more, making an aggrega in the neighborhood of nearly 900 acres, or nearly ten times as much the Paris Exposition. The buildings in the Paris Exposition covered space of 75 acres; that is, there were 75 acres roofed. In the Chica Exposition the main buildings alone will cover 115 acres; that is, lea ing out the sheds and ground that will be covered with live stock, whi will be over 40 acres more. In addition to the main buildings there a the buildings representing the Asiatic countries, the buildings erect by our State, buildings erected by other States, and the buildings erect by other nations. In all, we assume there will be nearly two hundr buildings on that ground; so, taking this in comparison, you can see h we expect to excel, so far as space is concerned. The Paris Expositi labored under great disadvantages, because the great nations of the wor refused to recognize it. Germany did not exhibit there; Englan refused; Belgium refused, and Italy, and so on. To-day we have fav able reports from sixty-four nations, each and every one of which p pose to exhibit in Chicago. England in making application sent t Commissioners, who applied for 220,000 square feet; it was grant being intended to cover England, Ireland, Wales, Scotland, and t other dependencies. The first thing we knew they were selling th

space over in England at so much a square foot, and refused to give any of it to their colonies, and even refused to allow Ireland to have any. Now, we have had direct information that these colonies and Ireland want space. I only tell you this to show the great interest they take.

In a conversation with Sir Henry Dredge, the English Commissioner, when he was here, he said to me: "We propose to make the very best exhibition we have ever made. We understand the circumstances, and it is our life blood. We don't propose to be outdone by the American manufacturers. We propose to let the people in American and other markets see that England can still manufacture, and manufacture as well as America. We propose to hold our trade, and we propose to get more of it if we can." That goes to show, I think, the interest the people of England are taking. In Germany they have applied for a very large space, and will spend a million and a quarter of dollars. Mr. Wermuth went back to Germany, and then wrote for more space, which we were unable to give him. If we granted all the space which foreigners apply for, we would not be able to give any to our own exhibitors. Australia called for an enormous space, and all we could give her was one tenth of what she wanted.

It ought to be our aim, then, to show people the capabilities of California. This we can best do by competing in every industry in which we have made progress. We should put our best efforts alongside of what the world can show in each department. In the vast building devoted to mines and mining, we should show what we have taken from the earth in the form of minerals, and how we have taken it. Our improvements in mining machinery should be exhibited. Specimens of our minerals and our building stones should be displayed, the latter in the rough and also worked into forms calculated to show their beauty and adaptability to the purposes of architecture.

In all the great buildings described California should be represented, and especially in the Horticultural Building, where the viticultural interests will be exhibited. The display should be made in such a way that when the distribution of prizes and medals is made we shall have our fair share of honors. Not only for this reason should we anxiously strive to make a showing in the big buildings, but because the visitor to the Fair whose time is limited will naturally confine his sight-seeing to the main attractions, and will be forced to give the State buildings no attention. Therefore, unless we are fully represented in the great departments, we shall miss much valuable advertising. Thus a man might wander through the Mines and Mining Building, should we omit to exhibit there, and not learn that California is still a great mining State; and through the Forestry Building without dreaming that we have valuable forests of timber.

But this will not prevent our having a comprehensive display in our State Building which will fully illustrate in a compact form all our resources. In that building we can show in a correct manner all that we are capable of doing, all that we propose to do, as well as that which we have accomplished. The competitive exhibits in the great building will not interfere with this at all, but on the contrary they will only serve to stimulate the curiosity of many visitors who would have otherwise ignored our State Building. The man who sees in Horticultural Hall a

fine display of California flowers will be stimulated to hunt for furth information, and naturally he will seek it in the California building.

Now, for the scope of the Exposition. This Exposition is divided in twelve great departments, and, as you have probably read, commenc with the Department of Agriculture. Then comes the Department of Li Stock. In speaking of this department I want to call your attention one other thing, and that is, there never was an Exposition in the histo of the world that had the scope of the Chicago Exposition, and will ta in displays that were never before covered in such a manner. I do n know of an International Exposition in the history of the world th ever had a live stock show. This live stock show will cover forty ac of buildings, with fifty-six acres of land. There are offered in cash p miums $150,000. I do not know of an Exposition in the history of t world where Horticulture was made a separate and distinct departme with a separate and distinct great building. I do not know of an Ex sition where the Agricultural Department was so great and comp hensive that it had to be housed in three buildings—one building the plants and forestry, another for the dairy, and another for the fi eries. This is the first Exposition where a large building was erect for the fish and fishery products and the apparatus of fishing. T is the first Exposition that made a great Department of Mines a Mining, erected a great building to house the exhibit and supp the necessary motive power, and to place everything connected w mining in one building. And then we have another novelty in t department called the Department of Transportation. This departm is my own suggestion, and I take great pride in it. The Department Transportation will show everything used in the world to transp human beings or merchandise by land, sea, or air, and with that sc you can understand, will include locomotive exhibits, car exhibits, ca cars, street cars, electric cars, wheel-barrows, etc., with models of eve thing ancient and modern in the way of transportation appliances t are known; in fact, taking in everything that we have ever heard and going back into ancient history and presenting models of old vehic some of which are being built especially for this purpose, so as to sh what man has used in the past for transportation. These will be hous in another magnificent building, which I will describe to you later

Then another innovation is the Electrical Building. It must understood that in other Expositions electrical appliances were exhi ited, but they were not arranged in great departments with spec buildings. In Paris they were exhibited in the Machinery Hall, b here a magnificent building is to be built for that purpose.

I will proceed to give you some idea of the buildings. [Here M DeYoung used the designs and plans for the purpose of illustration.]

You see here a picture of the general plan of the Exposition. Y see before you what is known as Jackson Park. It has a frontage one mile and a half on the lake front. Part of it was cultivated, a the rest was swamp. They have started in to grade a series of cana the excavations running through the ground, and in grading they ha made three artificial isles. Here is where the canal commences. Y notice here is a great lagoon; it is 1,400 feet long and 700 feet wide, a it has an arm running up here between the Agricultural Building a the Machinery Hall. It then passes between the Electrical Buildi and the Manufactures Building, and passes what is known as t

Wooded Island; the island is not to have any buildings on it at all, but it will be used for raising and cultivating flowers and plants. It will have half a million narcissus and half a million other flowers, making a perfect bed of flowers, which will be put out at different times, so as to have some of them in bloom all the time. An exhibit of roses will also be made on this island. The canal passes all around the Wooded Island, passes down towards the Illinois Building, and then to the Art Building. The artist takes a little license with this picture. The waterways are a little over three miles in length, and the intention is to have these canals used as a means of the conveyance of guests. There will be over five hundred boats, gondolas, etc., on the water, so that you can wander all around the grounds as you desire. An artificial bay will be constructed, and will be inclosed all around and protected from the storms of the lake, so that the boats can come out into the main lagoon, and be perfectly protected. At the entrance of this lagoon you will see a statue. It is emblematic of Liberty and our country. This statue will be 90 feet high. At the other end of this lagoon there is to be a great fountain constructed, the cost of which will be $50,000. The main parade will be 70 feet wide, and we propose to make an exhibit of California trees around it.

We now pass to a description of the buildings.

The first building on the grand square will be the Agricultural Building. This is one of the most magnificent structures raised for the Exposition. With its annex, it is to be 1,300 by 828 feet. On either side of the main entrance—you cannot see it here—Corinthian columns 50 feet high and 5 feet in diameter are placed. Passing through these columns you come to the main vestibule, which will be filled with statuary illustrative of the agricultural industry, and, in fact, everything connected with the building will be magnificent. Over the entrance there will be a mammoth dome 130 feet high.

Immediately behind the Agricultural Building comes the Forestry Building, 500 feet long by 200 feet wide, and constructed of rustic. A colonnade surrounds the exterior, the columns of which are made from trees contributed by the various States California has contributed three; they are taken from the trunk, 25 feet high, and placed there exactly as they grew, with the bark and everything. The sides of the building are made of rough slabs with the bark removed, and the roof is thatched with tan and other bark. In fact, it will be very beautiful. Within this building will be a sawmill in complete running order. Close to the Forestry Building will be an annex of the Agricultural building—the Dairy. This building will contain a model dairy with a collection of all its products.

Passing from the Agricultural Building we come next to the Machinery Hall, with its annex. The latter is connected with Machinery Hall by a colonnade, or series of columns. This is one of the finest buildings, architecturally, in the Exposition. If you will look at the front you will get some conception of it. This building will cost $1,200,000 to erect. The interior is spanned by three arched trusses, or girders, numbered one, two, and three. The size of this building, with its annex, which we are contemplating erecting, is 1,300 feet long by 990 feet wide. Under each one of these arches there will be a traveling crane, which will be used for putting the machinery in its place, and when the Exposition is opened will be used as a means of showing the visitors the exhibits. The

cranes move up and down, and will carry from two to three hund people at each time.

I will cut this a little short; there are a great many details.

A VOICE: No, go on.

MR. DEYOUNG (continuing): The next building that we come t what is known as the Administration Building. Architecturally, is the handsomest building on the ground. It is intended to be. usefulness was laid aside for its beauty. It has a central dome feet high, and this will be magnificently ornamented in gold. T building will cost $450,000. The interior features even exceed in bea and splendor those of the exterior, and the exterior is magnific Between every two of the grand entrances, and connecting the inter ing pavilion with the great rotunda, is a hall or loggia, giving acces the offices, and provided with broad, circular stairways and four sv running elevators. Above the balcony is the second story, 50 fee height, and from the top of this story rises the interior dome 200 from the floor. In the center is an opening 50 feet in diameter, giv light. The under side of the dome is enriched with deep panels, ric molded, and they will be filled with sculpture and rich paintings. size the rotunda rivals, if it does not surpass, the most celebrated do in the world.

This is the building for the administration and for the public, an not for exposition purposes. The offices for the administration of Exposition will be located in this building. In the third story wil the press rooms, where there will be rooms for all the great paper the country. In the center or lower floor there will be an accomm tion room for the public, and it will also be a meeting place.

Behind this building are the railroad depots, with eighteen tr running in.

Returning to the extreme end of the square, and going to the o side of the Agricultural Building, we come to what is known as Manufacturers' Building; you probably recognize it as the main bu ing of the Exposition. This is undoubtedly one of the greatest bu ings ever built for exposition purposes. It also has three arches ins the center one being 385 feet wide. At the Paris Exposition they one great building called Machinery Hall, and that was a magnifi building of iron and glass, with a span of 363 feet clear. You co take that machinery building and put it under the center arch of our posed building and you can lose it. This center arch is an enormous af rising 206 feet from the ground, and 385 feet wide. It is a magnifi arch, and on each side are two others 175 feet wide. Entering the m entrance you are met by an avenue 50 feet wide, running stra through the building. Now, you know a great many Exposition bu ings are not more than 50 feet wide, but here is an avenue 50 feet w The building as originally laid out had this place open instead, suppressed the dome. When these plans were first presented to Commission I asked Mr. Burnham what he proposed to do with this o space, which I thought was necessary, and he told me it was for ex itors. When I returned to Chicago they had taken it for machin etc. I figured that the foreign countries, as they exhibited at our C tennial, occupied about eight acres of our building. Admitting there will be no more nations exhibiting at Chicago, and that they w not need any more space, I found that there would be but four a

left for the entire American nation, and that was simply ridiculous. When I figured out the results about this building, the managers denounced me and said I was wrong. After making my figures, I asked Mr. Burnham and Mr. Jeffers to figure out exactly what this building contained, and find how many acres there were. Instead of 40 acres, if it were all roofed in, it only contained 30½; but, as a matter of fact, after taking the amount of space for aisles, which I figured at 35 per cent, I found there was not four acres left. They then asked me to go down to the office and explain it. The result was the taking out of these domes and putting in this enormous truss. When I proposed it, the architect said it could not be done, and he sent out for the iron men, who said it could be done. They drew the plans and submitted them to the Chicago Board of Commissioners, and they adopted them. The result was an increase in expenditure of $400,000. Notwithstanding the size of that building, which is a mile around the outside, and a third of a mile across, they haven't room enough. The building is intended to house manufactures and the liberal arts. The main entrance to this building is 40 feet wide.

We pass from the great Manufacturing Building to the Electrical Building. They are divided by a canal which is spanned by a magnificent bridge. The electrical display will be the most novel exhibit in the Exposition. We are devoting a great deal of time to it, and working out the most striking exhibit ever had of this character. The minarets on the building are intended to be covered with wires, and at night you will see flashes of light running around in a wonderful and beautiful manner. In addition to this, it is proposed to have a magnificent arch, lighted with a column as large as my body, to be lighted by 20,000 candle-power. The Electrical Building will be 700 feet long and 345 feet wide. Among the many novelties to be produced in this building is a private residence, and everything in this residence will be conducted by electricity, such as cooking and transporting the food to the dining-room, ringing the bells, calling servants, and, in fact, everything will be run by electricity.

Next to this comes the beautiful Mining Building. I have not a picture of it here, but it is to be a magnificent structure. The Mining Building is 700 feet long by 350 wide, and has galleries in it 60 feet wide. The entrance will be faced with marbles of different kinds and hues. In this building will be housed machinery of all kinds for extracting metals of all character and description.

We then come to the grand Transportation Building. This building covers a great deal of ground. The main portion alone is 960 feet long and 250 wide. Behind that there is an annex covering nine acres of ground. The principal and most striking effect of this structure is the entrance. The main arch is in the neighborhood of 56 feet in width, and commences with a series of receding arches. The doors are all covered with gold leaf.

We then come to the Woman's Building, and then to the Fine Arts Building, and next—what you are interested in—the Horticultural Building. One of the most attractive features of the Exposition will be the horticultural display. This mammoth building in which it will be exhibited is to be 1,000 feet long and 250 feet wide, and will cost half a million dollars. The dome is 187 feet in diameter and 113 feet high. In an open court is to be put a grove of orange trees from California. In

or under the dome will be a miniature mountain, built upon a framew and covered with rocks and shrubs. At the top will be a fountain, water making a cascade down the side of the mountain.

In this building will be exhibited your display. Under viticult we have fourteen classes, which very fully cover all your interests. will include an exhibit of vines of every kind, grapes, and every vari of wine, and of every method and process of extracting the juice, e and it depends upon you to reflect great honor upon California making a thorough exhibit in every one of these classes. In addit to what I have named, there should be a great deal more exhibit There should be cooperage, for instance. There was a very bitter fi as to where they should go. I drew my conclusions that they sho have their exhibit with California, so that if the coopers happened to into the viticultural class you could make a combination with them a fill their enormous vats. If it was taken away from California, y would have to bring your own casks. California ought to make a gr exhibit of cooperage. I think the largest oak cooper shop in the Uni States is located in San Francisco. I recollect in Paris they had cask that held twenty thousand gallons, and it was filled with wine.

The two classes at Chicago were brought together, and so, gentlem you have the cooperage in the Viticultural Department, and I hope y will take advantage of it. [Applause.]

Passing from the Horticultural Building, we come to the Woma Building. This building was designed by a woman, Miss Hayden Boston. It is to be 400 feet long by 200 feet wide, and will contai model hospital, a model kindergarten, and a model kitchen.

From that we pass to the Art Exhibit. This will be in the shap a Grecian temple, with two annexes. It will be a perfectly fire-pr building of iron, stone, glass, and brick, and will be 700 feet long 440 feet wide. We have erected a magnificent building, and have ap cations for more space than we can give.

We next come to a very handsome building, called the Fishe Building. It is of peculiar shape. If you will look at the plan you get a better idea than from my description of it. The Fisheries Build embraces a large central structure, with two smaller buildings connec with it on either end by arcades. The extreme length of the build is 1,100 feet, and the width 200 feet. In the central portion is a gene fisheries exhibit. In one of the polygonal buildings is the angl exhibit, and in the other the aquaria. The exterior of the building Spanish-Romanesque. In one of the tanks will be fresh-water fish a in the other salt-water.

In the center of the polygonal building is a rotunda 60 feet in diar ter, in the middle of which is a basin or pool 26 feet wide, from wh rises a towering mass of rocks covered with moss and lichens. Fr clefts and crevices in the rocks crystal streams of water gush and d to the masses of reeds, rushes, and ornamental semi-aquatic plants the basin below. In this pool gorgeous gold fishes and other fishes d port. From the rotunda one side of the larger series of aquaria m be viewed. These are ten in number, and have a capacity of 7,000 27,000 gallons of water each. Passing out of the rotunda a great c ridor is reached, where on one hand the opposite side of the great tan can be viewed, and on the other hand a line of tanks somewhat small ranging from 750 to 1,500 gallons each in capacity. The glass fronts

the aquaria are in length about 575 feet, and have 3,000 square feet of surface.

As you know, Chicago is an inland city, and has nothing but fresh water. The salt water will be brought from the Atlantic sea-board. It is to be evaporated about one fifth, and brought by the trainload. After getting it to Chicago they will add water from the lake and increase it to its former condition.

Looking at this map I want to say something to you about California, its building, and its location. At the time we were arguing and discussing the location of the State buildings, it occurred to me that I had better make up my mind very quickly where we wanted California's building to be. It is a very hard thing to decide which is the best, and where we cannot get the best place, the question is which is the next best place. I studied this proposition, went out on the ground, and drove all over it dozens of times. My first feeling was to follow Iowa and get on the lake front, which is a beautiful place, especially on a hot day, and convenient for visitors. But I thought we are not going there for the convenience of visitors; we are going there with a determination to show what we have; we don't propose to go there for the convenience of anybody, but we go there with the proposition of putting up a building that everybody can see. There will be so much to see there, the crowds will be so enormous, and they will be all making for the main buildings first, and they will have very little time to go to these other buildings. So I figured it out that if we could get our building where it would be near some attraction, it would be better for us. Instead of picking out a beautiful position where the lake could be seen, I picked out the next most important place, where the crowd would move. In the Midway Plaisance, before mentioned, will be placed all the Asiatic exhibitions, showing the streets of Bagdad, a great mosque, etc. My experience in Paris told me that there was not a human being there who did not go to the Asiatic exhibit. I know that there was not a day that I did not go there to see the dancing girls and the unique show. Now, taking my experience as that of everybody else, I made up my mind that the crowd would pass into this Midway Plaisance. We are right at the entrance of it; there are the different railroad stations, and all that crowd has got to pass there, and they can't pass without seeing the California Building. It is the first building they will see. We have a larger space than any other State in the Union, and we have a still larger space now, because we have absorbed most of Oregon's space. Colorado moves its line up, and its space is added to California. We have now a tract of 680 feet by 250 feet.

Well, gentlemen, I think I have taken up a great deal of your time. I will be pleased to answer any question on any matter of interest from any one of you. [Applause.]

Mr. C. A. Wetmore: Before Mr. DeYoung goes away will you kindly tell us whether any arrangement has been made to govern the viticultural exhibits.

Mr. DeYoung: Owing to the fact that the head of the Viticultural Department has not been appointed, the exact rules for that department have not been made. I don't know why they have made such a long delay in the arrangements of the Viticultural Department, but I think it is owing to the fight that is going on in Washington about this $5,000,000. All the heads of the departments are there. I see General

Davis is there. I think that is the main reason it has not been ma Of course the general rules cover all the departments, but the spec rules for the Viticultural Department have not been made.

MR. WETMORE: There is one more question. Has any plan be devised for the appointment of the juries for making the awards?

MR. DEYOUNG: Yes; we have a very elaborate report on the questi of awards about the appointment of the thousands and thousands jurors, but it will not be carried into effect until Congress makes appropriation. We have asked for $700,000.

MR. WETMORE: I mean what class of men will be appointed?

MR. DEYOUNG: We have appointed a committee of twelve, known the Committee of Awards, and on that I am pleased to say—I ma quite a fight for it—we have a Californian upon it, Mr. Mark L. M Donald. I think your interests will be well looked out for. The co mittee of twelve will appoint the juries; each foreign nation will ha a representative, and the women will have a representative. The gr bulk of the jurors will come from this country, but that has not be formally adopted, although the entire plan has been submitted to t National Committee, and if at any time you want to see it you can ha it, but it has not been issued for the general public, and will not until we have more money. [Applause.]

THE CHAIRMAN: Gentlemen, I have now great pleasure in introduci to you Mr. Charles A. Wetmore. [Applause.]

MR. WETMORE: Mr. Chairman and gentlemen, I have no speech make and no formal ideas on the affair. I was asked yesterday wheth I would say something on the advantages that may be derived fr this Exposition. I said, "Yes, I have some ideas on the subject, bu haven't put them in very good shape; I haven't worked them out."

Mr. DeYoung has most ably described what there is in it for Chica Chicago is to become the capital of industry in America on account this fair. All these magnificent buildings will benefit Chicago en mously.

I hear people complaining now. Men—business men—compla that we are going to have dull times in California, for the reason th this World's Fair will draw money away from us.

I think we ought to have a capital of industry in America. W ought to have such a place, and Chicago, I believe, is the best place this continent for it. There has been no mistake; we can't be bett located. Of course Chicago expects to reap enormous profits from Every part of the world will contribute something to the city. Ca fornia will contribute largely, but I don't know any class of people w can be asked to assist in this thing who are less able than our vi growers, and who have reaped less from their endeavors. We are day in a bad condition. We are not booming ahead, but are trying sell out; and it is a practical thing for us to ask, right now, What is th in it for us, and how are we going to benefit ourselves? I believe were right ten years ago; when we were in our prime of vigor we show what was possible in viticulture in California. We can go to Chica and show again; but for the benefit of whom? The real estate me But can we go and show how to help ourselves? Why, to be sure; can go to Chicago and establish agencies for selling out our vineyar [Laughter.] I know there is not a vineyard in twenty on this co that is not for sale, and we are going not only to provide money, but

our own good. I know that people are chuckling over the short crops. That is the condition that we are in, if we go to the World's Fair. Yet I believe there is a great advantage in it, and I believe we can reap advantage, if we go about it in the right manner. I believe, if we can get to our coast the right class of men, and show the great organizers of the country the opportunities of California; if we could only get one man such as Armour to take up our claim, I believe we might succeed. I believe in attracting some of these people, and I believe in using this World's Fair in bringing influential men from other States, and I believe we can do that. I believe that in advancing the interests of the vine men we advance the interests of California.

That leads to the question how we can best exhibit, and to our greatest profit. I believe that we should center our endeavors in making the State as a whole conduct the thing. I believe we should combine in making a grand display of the wines of the coast, instead of competing with each other. I don't know any one who ever made a dollar out of a World's Fair by his awards, except so far as advertising his goods goes. What we are suffering from to-day is a want of consumers in this State, and more capital to handle our goods, more capital to develop them, and work them, and place them before the public.

I see men all around me who have spent their last cent in building up this industry, and they are now engaged in merchandising. That is one reason there are not more here to-day. We have never had capital enough, and to-day we are in the most abject condition of any industry on the face of the earth. There is no industry that had such hope and such prospects in it that is to-day in such a condition as ours—praying for short crops, and trying to get out of business.

Now, I believe in handling this thing right for the vine growers, trying to see what the producers can get out of it. What does the producer want? He wants more merchants to handle his goods, and compete with each other in obtaining the best prices from the public. I would like to see the time return when the merchants would compete with each other in buying in order to get the best goods. It may be that in going to Chicago we can get them to do that, and I believe the vital question for us is, How shall we exhibit to the greatest advantage? I believe we should do all we can in building up these other industries, in building up the moneyed interests and getting people here, and to show the importance of new railroads to carry our goods, in showing the importance of other carriers in getting our goods to market. A party came in my place the other day, and wanted me to ship a case of wine East for him, and we couldn't do it. The railroad charges as much for one case as for three, and I could have taken two cases and filled them with rocks, and shipped all three for the same price that I would have paid for one. They have got us in the door; that is what is the matter, and they keep us there. [Laughter.] You all know the condition that we are in.

Now, for the World's Fair. Do you want go there, each individual of you, to get a medal? I have got one, but I don't know what use it is to me. I have got it in my window, but it never raised the price of my wine, except perhaps on a little I may have been able to place around the market here. It doesn't raise the price of my wine, nor give me any advantage in its sale. Is that what we are going for? No; we want to attract more people to this coast. We are in the condition of people

living entirely on expectations. We don't want any more advert ments of our horticultural and viticultural products until we get m people at home to use them, and we can have them if there is the ri spirit in the State, but we don't have that.

I asked Mr. DeYoung the question, "Has any arrangement b made to govern this department of viticulture?" It cuts an import figure as to who should govern that great building of horticulture, wh they put under the charge, I believe, of a commission agent. There a great effort made to get that under the charge of some one who k something about it, and it would be a good policy to get some one f this coast, but we can't get any kind of recognition, or get any per that we thought proper to represent us. Are we going to be put in same boat with horticulture? From the appearance of things, I th we are. I am afraid that we are going to be put in the hands of so body that don't know what we want, and don't represent us in any w

I don't know how that will work, so far as our interests are concern but we are going to meet Missouri, New York, and Virginia, and t will have five times the influence in the Committee of Awards that will have. I remember an instance in the Centennial. No one c away from there satisfied. Every little medal had to be fought for. first they were going to meet and give California no award at all. can't expect any power in that Committee of Awards in this competi from so many different States, but we can expect recognition for the lective display that is entered in competition, and we can expect s from our State exhibit, and there, I think, is where we should put in best efforts. It should be in our State exhibit, because we know w we can do there. We know what we are able to do, and the State sho be liberal in this matter. I see some of the members of this Commis recognize the fact that there is no industry in the country that ne help so much as we do; they recognize the fact that nine tenths of are on our last legs, and are being held up by the fellows that we something to.

We don't want to boom this State for the men that have lands sale, but after we have established ourselves satisfactorily we can t about increasing the acreage. The practical needs are the only ne to talk about.

We don't want to go into this Exposition in a spirit of rivalry don't believe in county exhibits; but the counties are all asking them. I know in Alameda County I was asked to be in favor of th and I got out of it. We would be but a fly speck against the wh world with that sort of representation. [Laughter.]

In Paris, in 1878, there were seventeen thousand exhibits of wine. was perfectly enormous; and the only way that we can make a cre able display and attract attention is to make an aggregate showing ourselves.

Let us remember that we are contending against great difficult Let us remember that we are going to Chicago, that great city wh they will not put our wines in their hotels. Let us try to get our w in the hotels. Let us remember that if we could get the hotels to them that it would be the best advertisement in the world for us, let us work it so that when we leave Chicago every hotel will have wines on their tables. A stranger going there finds none of our wi so let us put them in the hands of an agent. Instead of trying to b

our lands let us put our wines in the hands of a practical agent. Let us put in our exhibit as a State exhibit; let it be a competitive exhibit, and let the whole State be combined, and let the men who represent us here represent us there also. Let us see if we cannot get somebody at the head of that Viticultural Department who has some interest in us—not simply a desire for a place. Let us see if we are really a free American people. Let us see whether on the four hundredth anniversary of the discovery of America we can show the people in Chicago what we can really do. I think we are going to make a grand display, which will be worthy of us, but I think the men who will be talked about the most and written about the most will be the men who have the biggest interests, and not the men who have the best wines. It will be the men who have the biggest casks, or something of that kind. It may be that prices will revive and we will come back better satisfied; but we must go there in a public spirit to accomplish anything. Then we can win. Let us advertise this State all through; let us do as much to help the miner as we do for ourselves; the more people that get money the better for us who are in business, and we are here for the benefit of the public as well as for ourselves. As Mr. DeYoung says, we want to go there for the benefit of others, and we want to do some good for ourselves, and that is what I counsel you.

I don't want to say any more. Let us work collectively and ask the State body to help and support us all they can to place our goods on the market. [Applause.]

MR. C. J. WETMORE then announced the programme for the afternoon session.

THE CHAIRMAN: I will appoint as a committee to test the samples of wine which have been submitted, Mr. A. G. Chauché, Mr. J. Mortier, Mr. H. W. Crabb, Mr. F. Beringer, and Mr. F. A. Haber.

MR. N. J. HAINES then asked that the convention could afterwards sample the wines, in addition to the judges, as it would be a matter of education for those present.

A recess was then taken until 2 P. M.

AFTERNOON SESSION.

The convention was called to order by the Chairman.

THE CHAIRMAN: Gentlemen, the first business will be to hear from the county delegates, and hear what their counties have done toward having representation in the Columbian Exposition. I will first call on Napa County. Has Napa any organization, or do they want to say anything as a county to-day?

MR. C. J. WETMORE: Mr. Chairman, I think that Mr. Louis Zierngibl, who has charge of this matter, is present.

MR. ZIERNGIBL: We have had a meeting, but with very little success. We have tried to organize, and for that purpose I went around to see how many members I could get together. I have been out between three and four days, and got over one hundred members. We haven't organized yet, but a committee is coming down here to see what can be done. I have a list of the citizens of the county who are willing to join in the Napa County exhibit. That is about all I have to say.

MR. WETMORE: I would like to ask if the Supervisors of your county have appropriated anything?

Mr. Ziernqibl: Not that I know of.

Mr. Priber: I think the matter is in good hands now, and we w have a meeting at the court-house in Napa City in the next few days decide if an appropriation should be made or not. I think we will ha an organization as soon as we know whether the Supervisors will ta any action.

The Chairman: Is there any one here that wants to say anything behalf of Sonoma County?

Mr. Wetmore: Perhaps Mr. DeTurk will tell us whether the Sup visors have done anything.

Mr. DeTurk: I will say that the Supervisors have done nothing, a the indications are that they will not do anything. The people met t Supervisors and made their suggestions, and the Supervisors are un cided. Unless the people become more harmonious there will be not ing done, for the people are divided. There are a great many who opp it. They say we are already taxed about $9,000 in the State porti so, until we know what is going to be done, they will do nothing ab it. I think there should be an appropriation made.

The Chairman: Mr. Davisson, has there been any talk around y way?

Mr. Davisson: Nothing that I know of. I think you have very fu stated the situation.

Mr. C. J. Wetmore: I will state that in Alameda County I have b appointed Chairman of the Viticultural Committee for that county, a they intend to make a good viticultural exhibit. Nothing has b done yet, except appointing the committee, but I understand from World's Fair Committee there that whatever money we need will furnished by the Supervisors, whether it is $1,000 or $5,000. Nothi has been done yet, but we can depend upon it that Alameda County w make a good exhibit. They will make a county exhibit or a gene exhibit. I would like to ask Mr. DeTurk if the people are genera opposed to the Supervisors making an appropriation for the Worl Fair?

Mr. DeTurk: I am not able to say that the people are opposed to but they are divided. The Supervisors said that if the people wou come together and harmonize their discordant opinions that somethi might be done, but they didn't feel like doing it while there was division among the people.

Mr. C. J. Wetmore: I would also like to know whether if they approp ate, say $10,000, if it is to be advanced towards viticulture, or how mu to viticulture and how much to horticulture; or if they will do as in county, appoint a board or committee to take charge of it, leaving it to the committee?

Mr. DeTurk: In Sonoma County they have not decided. As I sta before, they left it to the people, and they are about evenly divid The appropriation was not asked for viticulture alone. It was ask for horticulture and viticulture, and to represent Sonoma in all of interests, such as timber products, dried fruits, green fruits, minerals, a everything they have. Viticulture wasn't mentioned specially, and my remarks should have given the inference that there was oppositi to viticulture, I wish to correct it.

Mr. C. J. Wetmore: That is what I want to know.

Mr. DeTurk: There is no feeling of that kind. Of course there are individuals opposed to it, but there are very few that have such a feeling.

The Chairman: Dr. Mintie, of Santa Clara, can you give us some information?

Dr. A. E. Mintie: I am glad to say that Santa Clara County is perfectly organized in the World's Fair work. A World's Fair Commission was appointed by the Supervisors, composed of thirty-six of the prominent citizens of Santa Clara County, and was appointed with a view of the entire county being represented. Those thirty-six, after several meetings, formed a plan by which they appointed sub-committees, each of the sub-committees to be drawn from the main committee. Then in order to extend the influence of those sub-committees and the committee at large, four or five other prominent men from the county were added to it. We have twenty-six sub-committees. Every branch of the display is handled in that way. The viticultural and wine committee is composed of J. W. Pierce, A. Malpas, J. C. Mann, and H. Detoy. Mr. Pierce is a member of the Commission appointed by the Supervisors from Santa Clara County. The other gentlemen were selected by the Chairman and members of the Commission to act on the different committees with which they were familiar. You see we have not been idle, and there is no reason why Santa Clara County should not come to the front in this part of the exhibit, as well as any other. So far as the viticultural interests are concerned at the present time, nothing has been done, from the fact that the sub-committee representing that department of the work has not yet had their meeting. It is the plan of the Commission to have these sub-committees meet as soon as possible, so that each different interest will be represented, and they can be harmonized into one body. There are very many obstacles in the way of having so many different interests represented. In the first place, the plan is to have a classified exhibit of the State as a whole, a certain portion of the building being devoted to showing the products of the State, and in which each of the counties is supposed to be represented. Another portion of the building is set apart for the county exhibits, so that each county may have its space, and exhibit its products as a whole. Each county will want to be represented in the classified exhibit, and in their own space. Santa Clara County has already applied for a space of 3,000 square feet, a space 50 by 60 feet square. Just what proportion of that space can be devoted to viticulture remains to be seen, after we know what is done by the other committees. I speak of that as one of the many obstacles that we have to overcome. The question as to whether Santa Clara County will enter as a whole in the department of the National Building has not yet been broached, but it strikes me that that is a good plan, inasmuch as the space in the California Building must be limited in order to make room. It seems to me it must be done on some such plan as that, and in that case the county as a whole will enter as a competitor in the Department Building. I regret extremely not to be able to report that the viticultural committee have met, so that I could give you some idea of what they will do, but whatever they do they will do as well as possible.

A Voice: Mr. Chairman, I would like to say one thing on that proposition. We claim to have a very good Board of Supervisors in Santa Clara County. They appointed one delegate from every school district to form a convention, but there was a clash; there were so many elements

which didn't harmonize, that the Board of Supervisors then selecte this committee. That committee then selected their sub-committee and they have proceeded to work in the utmost harmony. There i now no discord among them. I think that other counties that hav not already formed their committees, would do well to follow ou example.

MR. C. J. WETMORE: I would like to ask Dr. Mintie if the Supervisor have given any certain sum of money for any certain purpose?

DR. MINTIE: I will say, in answer to that question, that at a meetin some time ago of the Supervisors, there was some pressure brought t bear upon them, and the Supervisors passed a resolution to this effec that it was the sense of the Board that the sum expended be limited t $10,000. It was not positively limited, and last Saturday the Commi sion appointed a meeting with the Supervisors for consultation. Th members of the Commission present were business men and lar taxpayers, and a report that I had made that morning to the Commi sioners was read, and the effect was to show to them that a large amoun of work was to be done, and work that would cost money. When tha conference was over the $10,000 limit was knocked completely out the Supervisors' minds. I think the Supervisors intend to do ever thing possible to make the exhibit a success. They want a good exhibi and in order to show the sense of the Board at this time, they intr duced a resolution to this effect: That it is the sense of the Board tha the Commission appointed by the Supervisors proceed and secure a exhibit commensurate with the standing of Santa Clara County amon the other counties in this State as quickly as possible, and whatev money was necessary in order to represent Santa Clara County tho oughly would be furnished. They are limited to $40,000. Wheth they will use all that I don't know, but it is proposed to have an exhib that the people of Santa Clara County will be proud of, whatever th cost may be. That is the feeling, and I think that the Commission an the Supervisors are sustained by the people of Santa Clara County i that respect.

MR. C. J. WETMORE: I wanted to bring that out from Dr. Mintie t show that Santa Clara County is willing to appropriate so much mone for it. Alameda County is willing to do the same. The delegates fro the other counties can state to their Supervisors these facts, that th other counties here are willing to appropriate so much money, and ar going to make a good exhibit, and it is necessary for them to make good exhibit.

DR. MINTIE: Is there any one here from San Bernardino?

THE CHAIRMAN: I don't think so.

DR. MINTIE: Their appropriation is limited to $7,500. I am credibl informed that they have placed the limit at $50,000, and they are goin to raise the balance by private subscription. They are working alrea on that amount. It seems to me that this is one of the times that eve county should show what they are made of. It is an advertising pro osition that will not come to us again in a lifetime, as a county, and seems to me so stupid that any one having an interest in his count and in the State should allow this chance to pass without taking advanta of it. [Applause.]

THE CHAIRMAN: Mr. La Rue, we haven't heard from Sacramento. W are now inquiring what the counties have done, and what the Supe

visors are doing towards making a display in Chicago. Can you give us any information from your county?

MR. H. M. LA RUE: The Board of Supervisors have as yet made no appropriation, but they have promised that they will, and the President of our Board of Supervisors is taking a very active part in the work. Of course we are limited there by law to $7,500, and there is a disposition among the members of the Board to cut that down, but Sacramento is going to make a good exhibit. They have appointed a committee, I think, of fifty gentlemen and forty ladies, which is at work now, and we have a sub-committee of five active workers, and they are getting their plans in operation. I have an assurance from the Board of Supervisors that they will make an appropriation, but there is no amount fixed upon. I think when the time comes that they will appropriate money enough to enable the committee to make a proper showing. Thus far we have organized, and have a membership, and collect dues each month. We raise quite a fund in that manner. Our people are quite actively engaged, and will get along on quite a small amount of money, comparatively speaking. Of course ours will be more a horticultural than a viticultural exhibit, but they will be able to make quite a display of table grapes. There are only one, or two, or three wineries in the county. Wine making is not so important as it is in some of the other counties, but there are quite a large number of fruit shippers, and it is their intention to make a large exhibit of green fruits.

THE CHAIRMAN: Is there any one here from any other county that we haven't called upon who can give us any information? Not being acquainted with all the gentlemen here, I would like to have you volunteer any statement you desire to make.

MR. LA RUE: I would say that we have organized a District Commission in the lower Sacramento Valley. They don't propose to make a separate district, but it is to assist each county in getting information and giving information. Placer County belongs to that district, and will make a fine exhibit. Solano and Yolo Counties are also members of it, and we expect to have El Dorado and Amador, and probably San Joaquin. The next meeting will be called for the purpose of bringing the counties together for consultation, and every county in that district will get an appropriation from its Board of Supervisors, and will make an exhibit at the World's Fair.

THE CHAIRMAN: Mr. Swett, can't you give us some information from Contra Costa County?

MR. JOHN SWETT: I don't think that any action has been taken in that county. There is very little wine making, and only a few vineyards. There is no organization, and I don't know whether there will be or not.

MR. WETMORE: They raise a great many table grapes.

MR. SWETT: Yes, I know.

MR. WETMORE: That comes in the line of viticulture.

MR. HAINES: Mr. Chairman, I would like to inquire if San Francisco will not make an exhibit. What is the matter with that?

THE CHAIRMAN: Mr. Priber, can't you answer that question?

MR. E. C. PRIBER: Mr. Chairman, I am prepared to answer that question. I understand that the intention of San Francisco is to make an exhibit; and certainly, then, we will join the different counties from the Commission, if the Commission takes it in hand. I understand the intention is not to make an individual exhibit.

THE CHAIRMAN: So San Francisco will stand in with the exhibit, some form; that is all you can say?

MR. PRIBER: I will ask Mr. Bundschu, if he is present. His distr is San Francisco, and he is also a San Francisco merchant. We have had any meeting of the wine dealers, so I am not posted.

THE CHAIRMAN: Mr. Bundschu is not present, Mr. Priber. Is th anything else under this head? If not, we will hear a report from M McNeil, from the State Exhibit.

MR. W. H. MCNEIL: My report will be almost entirely of letters a answers that I have received from the department.

On April 19th I was appointed by the State World's Fair Commissi as Superintendent of the State Viticultural Exhibit at Chicago. immediately issued circulars, which I suppose everybody here h received—circulars numbered 1, 2, and 3; the first contains the objec the second the classification, and the third is a blank to be filled intending exhibitors in Group 20, Department B, which is the Viticu ural Department.

Class 119 is the vine and its varieties, shown by living examples, c tings, engravings, photographs, etc.

Class 120, methods of planting, staking, and training the vine.

Class 121, vineyards and their management.

Class 122, grapes for the table.

Class 123, grapes for wine making.

Class 124, grapes for drying—raisin grape culture.

Class 125, methods of, and appliances for, cultivating, harvesting, c ting, packing, and shipping grapes. This is also for raisin and ta grapes.

Class 126, white wines. This includes every variety of white wine

Class 127, red wine, which includes every red wine made, such Claret, Zinfandel, Burgundy.

Class 128 is for the sweet wines, such as Sherry, Madeira, and Port

Class 129, sparkling wines.

Class 130, methods of expressing the juice of the grape, of fermenti storing, racking, bottling, and packing, and wine cooperage.

Class 131, brandy of all kinds, methods and apparatus for the p duction of brandy.

Class 132, literature, history, and statistics of viticulture.

I sent out two thousand four hundred circulars, and I have recei so far eighty-nine answers, and of those eighty-nine, forty-two exhibitors, and seventy-five have been returned to me as uncalled fo

I have the rules and orders for the Horticultural Division of Chicago Exposition, and I think every one will be interested in know what they are.

A VOICE: That is, exhibits in the National Building?

MR. MCNEIL: That is, exhibits in the Horticultural Department, partment B. It will not be necessary to take up the time of the c vention in reading the rules, for every one can get the rules and r them. There are some, however, that are very important, that I read:

Rule 1. Exhibitors will not be charged for space. A limited amount of power be supplied gratuitously. This amount will be settled definitely at the time spa allotted. Power in excess of that allotted gratuitously will be furnished by the Ex tion at a fixed price. Demands for such excess must be made before the allotme space.

You understand that this is entirely in the competitive part of the Exposition—that is, in the Competitive Building. This has nothing to do with the California Building. The California Building is entirely under the California Commission, and whatever rules they may make afterwards.

Rule 3. Exhibitors must provide, at their own expense, all show cases, cabinets, shelving, counters, fittings, etc., which they may require, and all counter-shafts, pulleys, belting, etc., for the transmission of power from the main shafts.

Rule 4. Exhibitors will be confined to such exhibits as are specified in their applications. When the allotment of space is definitely made, exhibitors will be notified of their allotment of space and its location, and will be furnished with a permit to occupy the same, subject to the general rules and regulations adopted for the government of the Exposition, and the special rules governing the department in which their exhibit will be made. Permits for space will not be transferable.

Rule 6. Decorations, signs, dimensions of cabinets, shelving, counters, etc., and the arrangement of exhibits, must conform to the general plan adopted by the Director-General.

Rule 10. The expense of transporting, receiving, unpacking, and arranging exhibits, as well as their removal at the close of the Exposition, shall be paid by the exhibitor.

This I understand will be paid by the California State Commission, so that does not make so much difference.

Rule 13. If exhibits are intended for competition it must be so stated by the exhibitor, or they will be excluded from examination for awards.

Rule 14. The chief of each department will provide cards of uniform size and character, which may be affixed to exhibits, and on which will be stated only the exhibitor's name and address, the name of the object or article exhibited, and its catalogue number.

Rule 16. Exhibitor's business cards and brief circulars only may be placed within such exhibitor's space for distribution. The right is reserved to restrict or discontinue this privilege whenever it is carried to excess, or becomes an annoyance to visitors.

Rule 21. An official catalogue will be published in English, French, German, and Spanish. The sale of catalogues is reserved exclusively by the Exposition Company.

Rule 22. Each person who becomes an exhibitor thereby agrees to conform strictly to the rules and regulations established for the government of the Exposition.

Those are all the rules which it will be necessary to read. Now, as to the correspondence which I have had with Mr. Samuels, and which includes nearly all the work which has been done so far. I will read the letters which I wrote and the answers so far received:

San Francisco, April 30, 1892.

J. M. Samuels, *Chief of Horticultural Department, World's Columbian Exposition:*

Dear Sir: I have been appointed Superintendent of the California Viticultural Department by the California World's Fair Commission—

Duties—The collecting and care of all such exhibits, whether they are for your department or the California Building. I need some information, as follows:

In making application for space for the competitive exhibit, must each exhibitor make his own application, or can I, as Superintendent, make a collective application, giving each name, with numbers of wine or article to be exhibited?

Can you give me, approximately, the amount of space that will be allowed to California in the Horticultural Building, Department B, Group 20?

Circulars are being mailed to every viticulturist in the State, to enable us to know the number of exhibitors.

To what date can application for space be made?

Please mail to me direct all rules, regulations, and information for the guidance of exhibitors, as promulgated by you or the General Directory.

Please send two hundred copies "Classification and Rules, Department of Horticulture;" also all blanks needed for the instruction of all exhibitors. A Viticultural Convention will be held May 18th.

I remain, etc.,

W. H. McNEIL.

WORLD'S COLUMBIAN COMMISSION,
OFFICE OF THE DIRECTOR-GENERAL OF THE EXPOSITIO
DEPARTMENT OF HORTICULTURE,
CHICAGO, ILL., U. S. A., May 6, 1892.

W. H. MCNEIL, *317 Pine Street, San Francisco, Cal.:*

DEAR SIR: I have your favor of the 30th inst., and will take great pleasure in ans ing the questions asked. I am glad that you are taking hold of the viticultural en the California exhibit and intend to push it, as applications for exhibits in the viti ural group have been coming in more slowly than those in the other lines.

In reply to your first question, I would state that it would be best for each indivi firm wishing to enter an exhibit to make a separate application, those that you se passing, if you so desire it, through your hands before forwarding here, so that you keep a record of the applicants and the space they desire to occupy. We will, from t to time, notify you of the applications that have been received from all viticulturis California, so that your record may be kept complete.

The amount of space to be allotted to California for her viticultural exhibit will dep entirely on the number of applications received, the amount of space asked for the and the total amount of space at our disposal. This is a matter that cannot be adju even approximately, until the greater bulk of the applications have been received. H our anxiety to have all intending exhibitors make application at the earliest poss date.

No actual date has as yet been set on which applications for space shall cease, b is expected that the allotment of space will be made during the month of July, by which time the bulk of the applications are expected to be in.

I send you by to-day's mail packages of blanks, classification of the department, other printed matter that may be of interest.

Hoping that you will write to me whenever I can be of any assistance in the v you have in hand, and that you will succeed in collecting a very fine exhibit, I rem

Very respectfully,

J. M. SAMUELS,
Chief Department of Horticultu

SAN FRANCISCO, May 7, 18

J. M. SAMUELS, *Chief of Horticultural Department, World's Fair:*

DEAR SIR: Another point I wish to ask about—

Class 126, Group 20, Department B, Table Grapes.

Our grapes do not mature or are not in condition to exhibit till about August 1st, later. Will the time of entry be extended for such products?

Can exhibitors have special space for individual exhibits in the main building?

I am, yours respectfully,

W. H. MCNE

SAN FRANCISCO, May 7, 18

J. M. SAMUELS, *Chief of Horticultural Department, World's Fair:*

DEAR SIR: Class No. 126 says "White Wines."

We have in our State Exhibit as follows: Burger, Chablis, Chateau Yquem, Gut Golden Chasselas, Hock, Haut Sauternes, Sauternes, Sauvignon Vert, Semillon, Ries Traminer, and White wine, thirteen in all. Will these be judged separately, or they come unclassified under one head?

Red wines, we have Beclan, Burgundy, Cabernet, Carignan, Chambertin, Cha Noir, Claret, Grenache, Gros Mancin, Malbec, Margaux, Mataro, Petit Syrah, Pino Julien, and Zinfandel. Does same rule apply?

Yours, etc.,

WM. H. MCNE

CHICAGO, ILL., U. S. A., May 11, 18

W. H. MCNEIL, *Esq., Superintendent Viticultural Department California World's Fair mission, 317 Pine Street, San Francisco, Cal.:*

DEAR SIR: Applications have been made by nearly every country in the world space in the Viticultural Exhibit, and the area applied for, even at this early da much in excess of the amount available.

Would it not be advisable to suggest to your State Viticultural Association, a forthcoming meeting, to send a committee to Chicago, or select some Californians may be here, to look over the building and grounds, and designate the area and loca that will be needed by the viticulturists of your State?

As the representatives of the leading viticultural State of the Union, any sugges in regard to the number of bottles or quantity of each brand of wine or brandy should be allowed to each exhibitor, and other matters pertaining to a proper dis will have considerable weight in deciding rules that will apply to the exhibits.

In reply to yours of May 7th, I will state that Class 126, to which you refer, wi elaborated into sections and sub-sections, and each brand of wine will be judged s rately, as mentioned in your letter.

The fruit exhibits of the department will be divided into ten or eleven departments. The United States will be divided into three grand divisions, to conform to the character of the products, and the manner of growing them; thus, California grapes will be placed in the Western District, which will be the country lying west of Kansas. Grapes, of course, will be exhibited at the time they will be in best condition for that purpose.

Individual exhibitors can have special space, but all those from the same State will be placed contiguously in the space that will be assigned for the general exhibit from that State.

Very respectfully,

J. M. SAMUELS,
Chief Department of Horticulture.

SAN FRANCISCO, May 12, 1892.

J. M. SAMUELS, *Chief of Horticultural Department, World's Fair:*

DEAR SIR: Yours of the 6th received and noted, and am very much obliged for the information contained.

I have all along said the important item was to obtain the number of exhibitors in my special department. As soon as I received my appointment I at once set about trying to find who would exhibit. Next week there will be held a World's Fair Viticultural Convention. At that time many will express their wants, and I will give to it what information I have, especially your letter.

In making a display of wines, not very much space will be needed for each exhibitor, but a number being collected together can make a fine display, and the more space allowed the finer the display will be in the main building, or in the grounds around it.

If you will kindly furnish me the copies of all applications as you say, I can then keep my record complete. I have quite a number on file, which will be forwarded to you very soon.

Sorry you cannot give me some idea of the space that will be allotted to California in the main building and grounds, for it would give me a better idea of what can be done.

I have stated that by July 1, 1892, all applications for space must be in your hand.

I suppose nothing has been done regarding rules for the examining jury.

Yours respectfully,

WM. H. McNEIL.

I therefore say that July 1, 1892, is the limit of time for application for space. I saw that in the papers, although there has been no official notice of it given.

It remains entirely for this convention, and also the members of the viticultural interests in this State, to help me in this matter. I think, from what they have said here, that it would be well if I forwarded the applications all at one time, and make the largest number possible. It states here that it is necessary for us to have as large a number of exhibits at one time as possible, and by keeping a record of them, through my office, we can keep an itemized account and tabulated statement of everybody who will exhibit. It will put no one out, and the amount of space depends entirely upon that.

The next letter I read was dated May 7th.

In Class No. 126 it says "White Wines." I gave him the number of wines, which in this case is thirteen in all, according to the list that we have in the Viticultural Café. I asked if they would be judged separately, or would they all go in under one head; and I stated afterwards the number of red wines that we have, and the answer to that question you have heard.

I also asked about table grapes, where it says "Our grapes don't mature," etc., and to that question you have also heard the answer.

You see the importance of making our applications as soon as possible, and having as large a number as possible.

I understand that Germany alone, in this Viticultural Department, has one hundred and forty exhibitors, and we, so far, have only forty-two. Mr. Samuels also asks us here at this convention to state regarding the extent of our display, and we want to answer that right here.

In the matter of blanks, I have copies of all the necessary blanks

with which to make the official applications, and also of the spe blanks that have been formulated for vines or trees to be packed boxes, giving the height in feet, etc. I have all the data necessar order to go there.

I have received answers to my circulars from the following: A. Har thy & Co., Yolo County; Jacob Schram, Napa County; Hoelscher & San Francisco; A. B. Humphrey, Mayhew; Eli Wells, Mayhew; Joh Rodgers, Martinez; California Wine Growers' Union, San Franci John L. Beard, Warm Springs; William Harvey, Fresno; C. C. & Agee, Dixon; Barton Estate Co., Fresno; A. G. Chauché, Liverm Santa Cruz Mountain Wine Co., Santa Cruz; Cupertino Wine Cupertino; John Pollock, Central House; Charles Cranz, San José; Heney, Jr., Mountain View; Fresno Vineyard Co., Fresno; El Q Vineyard Co., Santa Clara; St. Hubert Vineyard Co., San Franci St. George Vineyard Co., Santa Clara; Margharita Vineyard Fresno; M. D. Phelps, San José; Robert Hall, Sonoma County; Pa Morton & Monteagle, Tulare County; N. J. Haines, San José; J Crellin & Son, Pleasanton, Alameda County; A. Repsold & Co., Francisco; Katherine MacKenzie, Santa Cruz; John A. Stewart, Sa Cruz; A. H. Grossman, Napa; Paul Bieber, St. Helena; J. B. Whitco Colfax; M. M. Estee, Napa; Webster & Sargent, Minturn; Willi Wehner, Evergreen; A. B. Dresbach, Indian Springs; D. D. Daviss Sonoma; Lay Clark & Co., Santa Rosa; J. P. Onstott, Yuba City; Benjamin, Santa Rosa; Mrs. E. E. Wise, Healdsburg.

I think that is all I have to say. This gives the result of the wor have done in the last three weeks.

You have here a picture of the California Building, as it is propo situated where Mr. DeYoung said, right at the eastern end of the M way Plaisance. This, of course, is going to be amended a little, bu is understood that the whole show of the State will be here [showi This upper part is to be reserved for the California Café, for the sal the products of this State, both wines, fruits, and vegetables. [Applau

THE CHAIRMAN: Does any one want to ask Mr. McNeil any questio

MR. S. P. CONNOR: I have a few questions here that I would answered. Would it not be a good idea to ascertain how many coun are represented here by asking members from each county to sta Then appoint a committee, of say three, from each county, to form a p on general organization and the best way to exhibit, and let them rep and have the report acted upon by the whole meeting.

THE CHAIRMAN: I think that is covered by most of the county orga zations in this State.

MR. CONNOR: I mean only the viticulturists.

MR. C. J. WETMORE: Mr. Connor wants to get the number of deleg that are here in this convention from the different counties, and t have the committee, as I understand, meet together, say after we through with the convention meeting, and then report to-morrow mo ing some plan of action that they have prepared among themsel and then have it discussed when we meet to-morrow morning.

DR. MINTIE: I would like to ask Mr. McNeil about the sale of fru Do you mean actually that there can be sales of fruits?

MR. MCNEIL: That is as it is understood at present.

DR. MINTIE: Simply in the café? I asked the question for this reas It occurred to me possibly that when the Exposition is under way

could make arrangements with the fruit growers to send fruit every day, and to have the first day exhibited on the tables, and then the second day to have that replaced by new fruit, and to sell what was exhibited yesterday, for instance, to-day.

MR. McNEIL: I think that is a decidedly good proposition.

DR. MINTIE: That is the reason I asked the question.

MR. McNEIL: Of course my duties are connected with the viticultural exhibit, and the care of it. I also have charge of the café at Chicago, as it is understood that we are to have a café in our own building. There will be at least one hundred and fifty cafés and restaurants in and around the grounds, and they will have a seating capacity of eighty thousand. You see by the position of our building on the ground that it will have a good situation, and I include the sale of wines and California fruits and vegetables. Arrangements will be made whereby we can receive them daily, or every two days, say, whatever is necessary, and I should think that plan would be a good thing to adopt by this convention.

THE CHAIRMAN: Mr. Connor, if you will make this as a motion we will get the sense of the meeting.

MR. CONNOR: I will make a motion to that effect.

THE CHAIRMAN: That you call on the various counties that are represented here?

MR. CONNOR: I make a motion that the delegates from each county stand up separate, that when each county is called for the delegates stand up to show which counties are represented.

THE CHAIRMAN: Do I hear a second to the motion?

A Voice: Second the motion.

MR. BUNDSCHU: I would like to know if the motion covers the point that it is the official representatives of the county, or if any one from any county can get up and say, "I represent that county." Must it be the official representative of the county?

THE CHAIRMAN: It has been moved and seconded that the delegates from each county present stand up, and that a committee of three be appointed from each county to form a general plan on organization, and the best way to exhibit, and let them report, the report to be acted upon by the whole meeting.

MR. McNEIL: I will state that in the call for this convention the different county World's Fair organizations were asked to send delegates here. We sent out probably three thousand of these circulars to all portions of the State. Now, the county World's Fair organizations might send delegates, and the people from the same county may have been invited to attend, and they may be here. I think it would be a good idea for every person from each county to stand up.

MR. CONNOR: Provided they represent viticultural interests.

DR. MINTIE: It seems to me that motion is hardly practical, to appoint three from each county on a committee. For instance, there are fifty-four counties in the State. Suppose all the counties are represented, we will have a committee of one hundred and fifty. It seems to me we can cover the ground, and I will offer as an amendment to that motion, that one representative from each of the counties here be placed upon that committee, and that they formulate a plan and submit it for action before this body.

[Amendment seconded.]

Mr. Bundschu: I would request our Chief Viticultural Officer, Wetmore, to state to this meeting how the Board of Viticulture th that can be accomplished. There were different branches that wa to be recognized; and we had a discussion about that, and though would be best to select different persons to represent each branch. you state it, Mr. Wetmore?

Mr. C. J. Wetmore: I will state that at the meeting of our Com sion yesterday we thought it best to appoint a committee on cer branches that would be represented at this convention, or accordin the call. The call was for all persons interested directly or indire in viticulture, whether they were grape growers, wine makers, bra distillers, wine merchants, raisin packers, coopers, manufacture stills, or manufacturers of wine-making machinery, and we expe to have a full meeting and representatives from all these diffe branches. It therefore occurred to us that it would be better to app a committee from each class, as, for instance, the distillers, the commi to act with Mr. McNeil, and to report to the State World's Fair Com sion, and all our actions are to be reported by him to them. If we here in any manner which is contrary to their rules, it would be ou order. Now, if there was a distillery committee, a committee on wine branch, the cooperage, and such things as that, Mr. McNeil at time could converse with those gentlemen and ask them questions determine what is necessary to be done. It seemed to us yesterday if such committees of these different branches were appointed it w answer all purposes, and that is what we are coming to now. Yeste at the meeting we suggested certain names, and of course it would for this meeting to suggest names, or adopt the names that suggested yesterday.

Dr. Mintie: Mr. Chairman, we have met for the purpose of de mining the best way to exhibit the viticultural interests of this S It seems to me that while that idea is first rate, there is so m machinery about it that it will almost fall of its own weight, whe it seems to me that the motion of the gentleman on my right to h the counties represented, and to report to this body some plan, practical one. For instance, can we exhibit growing vines, and i where? Shall we exhibit as a State, as Mr. Wetmore suggested in speech this morning? All these questions, it seems to me, should brought before this body, hence I am in favor of the motion as amen before the house.

[Upon being put to a vote, the amendment was declared carried.]

Mr. C. J. Wetmore: Now, we must have some manner of finding how many counties are represented.

Dr. Mintie: It seems to me the only way is to call the coun alphabetically, and have them respond.

Mr. Connor: It seems to me the motion is rather mixed up. motion was to call up the counties, and ascertain how many coun were here, then afterwards to have the committees appointed.

The Chairman: I guess it was understood; the counties are not numerously represented.

Mr. C. J. Wetmore: Dr. Mintie included that in his motion.

Dr. Mintie: The amendment I offered was to change the num from three to one.

The Secretary: I will say that I can see here representatives f

Napa, Sonoma, Alameda, Santa Clara, Contra Costa, Los Angeles, Sacramento, and San Francisco Counties. Are there any other counties represented?

MR. C. J. WETMORE: Another question is, how shall this committee be appointed? Will the different members from the different counties come together and appoint one member from their delegation to represent them, or shall the Chair appoint the committee?

MR. CONNOR: I think it would be safe to leave it with the Chair, and I would make that as a motion.

[Seconded.]

[The Chairman then put the motion, and the vote being in the affirmative, it was declared duly carried.]

THE CHAIRMAN: The committee will be appointed before we adjourn. The next subject for discussion is the preservation of fruit in jars. Professor Hilgard is expected to speak on that.

PROF. E. W. HILGARD: I have been requested to say something to you in regard to the preservation of fruits for the World's Fair exhibit, and I shall tell you something about the experiments that we have made on that subject for the last two years. I am sorry to say that the experiments were not continued during the last year, on account of lack of time.

Those present, I suppose, understand that it is necessary to use liquids in preserving specimens for any length of time. It is not possible to take a bunch of grapes, or fruits of any kind, and preserve them in their natural state without loss, unless in liquid. Of late, a number of articles have been published speaking of preservation in gas. This is not used, because the charging of the cars and transportation will cost so much that it is impossible to make it up.

Bruising is one of the greatest troubles, you will find, in preserving fruit; and the first thing, therefore, which it is necessary to observe in putting up fruit, even in liquids, is not to have it too ripe. In fact, the rule which should be observed is to have the fruit as unripe as you can get it and still represent the color and shape and size. The harder it is the better. You cannot expect to have fruit so that it will keep, and at the same time have it ripe. You will find that true of almost any preservative that is used, so far as we know.

In getting specimens, the first thing is that they should not be too ripe. I will show you the result of putting up specimens too ripe in corrosive sublimate, the best preservative that we know, and you will see how impossible it is, even with perfect care, to preserve them. If the jar had been transported the fruit would have been completely out of shape. Now, in gathering fruit, don't confide it to any one who is not interested, and who will not touch and handle it just as little as possible. The proper way would be not to touch the fruit at all, but to handle it in pieces of tissue paper, and don't handle grapes at all after they bloom. In the preservation of grapes in good condition, of course it is absolutely necessary to suspend the bunch from the top of the jar, and you can get your jar with a hook ready for that purpose. You can get these in the market, and they are not very expensive either.

Now, in regard to the liquids to be used. It may be said that practically there are three that will interest us, because we generally use one of these three. These are sulphurous acid gas, which we use in preservin fruit, and which you have seen used; salicylic acid, and then the best

preservative of all is corrosive sublimate. Corrosive sublimate is poisonous, however, that on the whole I don't think it is well to put in the hands of those that usually put up fruits; but it takes but a ve small quantity of corrosive sublimate to make a very good preservati liquid. The only trouble is that while it preserves the fruit very w for a few months, it deposits on it that fine, little white film that mak it look corpse-like, and it doesn't look very well. The fruit that th preserve most successfully with corrosive sublimate is figs. Grapes haven't tried. I should think, though, that they would not lo different with corrosive sublimate from their natural condition. should say, with regard to this liquor, that the less you handle it better, as it is very poisonous.

The preservative that is best known to you all is probably sulphuro acid. It is known in all the wineries, and how to make it. This a is easy to manage. All you have to do to make it is to burn sulph strips in a keg or barrel sufficient to impregnate the water. In actu experiments that I have made, if I wanted to make half a barrel of t liquid, which is made from the fumes of burning sulphur, I would the barrel half full of water, and then burn the sulphur strips in it eig nine, or twelve times to get the proper strength. That is to say, y push the strip in the bung-hole, cover it over, and let it burn until goes out, then agitate the barrel. That is the method. It takes abo an hour to finish a barrel, and, remember, the bigger the barrel the b ter, and the less liquor you put in the better, but if you fill it half f it will take about twelve burnings to make it strong enough. T strength is very weak then; it is only one tenth of 1 per cent. Th the water smells strongly of sulphur, and must be kept bunged up.

When you use this solution the first thing necessary is that the fr used should be tested. If the solution used on the outside is stron than the liquid on the inside, the fruit will shrink; and if it is the co trary, the fruit will burst. In the case of grapes, sometimes there toughness enough to resist the action. For instance, take the Caber Sauvignon; it might not burst; but if you take a delicate-skinn grape you can't trust it, and the only way to prevent their shrinking bulging is to make the solution on the outside of the same density the solution on the inside. No matter what solution you use, or wh it is, you must do this, or the grapes, and particularly delicate-skinn grapes, will not stand it. One of the best agents to use is glyceri you can use sugar, but glycerine is better, and is now cheap enough do it. Most skins will stand a little stretching. Grapes with as mu as 25 per cent of sugar should not be put up at all. They cannot preserved. They will fall off.

Now, as for the effects of these different liquors. I have alrea stated that the corrosive sublimate deposits a little white powder wh it is hard to get rid of. Sulphur, as you know, bleaches, but with wh grapes that makes no difference.

There is one other solution that I think well of, and that is salicy acid. Salicylic acid solution is an excellent preservative, and it is v easy to make. It takes only an ounce to five gallons of water, and must dissolve it well in cold water. It is very necessary that it sho be fully dissolved. One ounce in five gallons has been proved to about the right strength, but, as I said before, you must get the dens the same inside as outside the grapes, but you will have very little d

culty about that. If you can't trust yourselves to make that solution, it is better to have a druggist make it. They can follow out the directions without any difficulty.

I will show you some specimens of fruit that have been preserved in that way, and here are some apricots that were a little too ripe. They have been preserved in corrosive sublimate, and every one is broken open. There was no glycerine added, and they have become too large for their jackets. They have changed in form, and the corrosive sublimate has given them a ghastly look, but they show the size pretty well. I show you here the results of the operation of salicylic acid with and without glycerine. I suppose you can see that these are perfectly preserved in shape, but they have lost color. Here is a cherry that was ripe, and there was no glycerine added; these two specimens are exactly the same thing, except that one has had glycerine added to it, and the other has not; they are white cherries.

Now, here you have a cherry which is very common, but it is larger than any ever grown on a tree. It has swollen. Here is a Governor Wood which has burst, and shows the effect of not adding glycerine. Here they show the effect of too much glycerine. Here are two jars containing the same cherry, one without glycerine—just with the liquor. It is sulphurous acid liquor, and here is one that has too much glycerine. In passing these around you will see that one has shrunk too much, and the other has burst open.

When it comes to oranges and fruits with thick skins, fluid doesn't attack them.

MR. C. J. WETMORE: I would like to ask whether either one of those, corrosive sublimate or salicylic acid, will preserve the color?

PROF. HILGARD: They will not keep it perfect. I don't believe anybody has succeeded in doing that yet. For black grapes I think the best thing is salicylic acid, and for white grapes sulphurous acid is better. I understand that Mr. Turrill has a liquid which has preserved fruit for seven years. I haven't been able to do that, and I would like very much to know about it myself. Now, gentlemen, I have shown you samples for pretty much all that I have told you, and I leave it to you to act upon as you wish. [Applause.]

DR. MINTIE: You have spoken of sulphurous acid for white grapes, and salicylic acid for black. What fruits outside of the grape would you use salicylic acid for?

PROF. HILGARD: For every deep-colored fruit. I have experimented somewhat with other fruits, and I couldn't get as much satisfaction from the other two as I could from this. Now, with anything that is green, I don't know what the chemical action is, brown spots will come on the leaf, and ultimately it will all become brown; and while it will not take the color away as rapidly as sulphurous acid, it will in the end. Sulphurous acid is the one that most people will use in fruits which do not need to be preserved as to color. I know of no preservative that will keep the color. The fruit should be very carefully washed before preserving it.

MR. CONNOR: How do you get the sulphur in the bung-hole?

PROF. HILGARD: You use the sulphur strip; that is to say, a strip of cotton cloth such as you use all the time for sulphuring barrels, and light it at the end and put it in the barrel and close it with your hand

or finger. Then let it burn, and then shake it up, and in the meantin it will be all absorbed. Then do the same thing over again.

DR. MINTIE: I had a barrel with a cover made for the purpose, and merely cover the top over and I burn sulphur in a pan. I succeed getting a very strong solution.

PROF. HILGARD: That is the method adopted by the Board of Hor culture. The trouble is to have a place where you can do it witho choking yourself. In this case you have four or five vents.

DR. MINTIE: You can obtain these strips prepared, or you can simp tear off a piece of cloth and put it in sulphur.

THE CHAIRMAN: There are plenty in the market for sale. You can g them by the hundred pounds if you want. Now, gentlemen, we w announce our committee, and then we will hear from Mr. Turrill.

MR. S. P. CONNOR: An idea has occurred to me since. I think t Viticultural Commission should have one representative in that co mittee, and if it is not too late I will make that as a motion.

THE CHAIRMAN: Mr. Bundschu and Mr. Bichowsky will act with t committee, so it is the same thing.

[The Chairman then announced the committee, as follows: Fr Napa, S. P. Connor; from Sonoma, D. D. Davisson; from Alameda, A. Chauché; from Los Angeles, E. C. Bichowsky; from Santa Clara, W Wehner; from San Francisco, Charles Bundschu; from Sacramen H. M. La Rue; from Contra Costa, John Swett.]

MR. C. J. WETMORE: I suppose that committee should report to-m row, should they not?

THE CHAIRMAN: Yes, I suppose they can.

MR. C. J. WETMORE: We want to finish up the World's Fair busin to-morrow morning, because to-morrow afternoon we want to attend other matters.

THE CHAIRMAN: Mr. Turrill, we will hear from you on fruit preser tion.

MR. C. B. TURRILL: Gentlemen, I have but very little that I can say this subject. I have a jar here that I have carried around the count for nine years. It contains a bunch of grapes that I put up in Fresno the fall of 1883, and the jar was taken by me from here to New Orlea from there to Louisville, back to New Orleans, and then here. It h been exposed to all conditions of light. There has been no chance keep it in the dark, and, as you understand, that is one of the m important things in the preservation of fruit. I can't give you t formula of this solution. I don't know whether I have it or not. was a solution that was prepared by a chemist who has since died died while I was away from the State—and I made efforts to ascerta whether he made any memoranda in regard to his solution. Up to t present time I have not been able to ascertain. I am going to lo into the matter in a very short time, and see if I can get it.

I have used a large quantity of this solution, and will say that other fruits it has acted very well—I think equally as well as it has this bunch of grapes. You all understand, of course, that taking seve peaches and putting them into jars, you often find one that does n keep as well as the others, and that is on account of the different degr of ripeness; but I have preserved peaches, plums, prunes, and gra especially well, and still half of them have lost a portion of their co I think they have all retained their color better, though, than in a

other preservative solution that I have ever seen. I don't know that there is anything more that I can say to you about it, except to show you a specimen.

DR. MINTIE: Can you give us any idea as to whether the solution is expensive?

MR. TURRILL: No, it is not expensive. I have all the bills.

[At this point the convention adjourned until to-morrow morning, May 19th, at 10 o'clock.]

SECOND DAY'S PROCEEDINGS.

SAN FRANCISCO, May 19, 1892.

[I. DeTurk acted as Chairman.]

THE CHAIRMAN: Gentlemen, I have great pleasure in introducing Capt. Thomas H. Thompson, Secretary of the California World's Fair Commission.

CAPT. THOMPSON: Mr. Chairman and gentlemen, the President has just asked me to cover a little more ground than I expected. I would say first, on behalf of the Commission of California, that we wish, in every way possible, to assist you in making an exhibit at Chicago that will be thoroughly successful, and a credit to the State. It has been a subject that has received a great deal of attention at our hands (almost more than any other), and we were in hopes that after this convention that you people would develop some plan and submit it to us, showing how and where and when we could best assist you. We are placed in a very peculiar position. In order that you may know some of the difficulties that we have had to contend with, I will say this: that on the 1st of December last, before there was a dollar available for the use of the Commission, we had on file in our office applications for over $500,000 from the people of the State of California, each one of which applications was backed up with from one to ten pages of type-written matter, going to show that that was the most important matter in the State of California. In those applications there was not a word from the Agricultural Department, the Horticultural Department (including viticulture), and the Mines and Forestry. There were four great industries that had not applied for a dollar; still, there were on file applications for over $500,000. So you see the Commission has had a pretty knotty problem to solve. These people all wanted us to help them make their exhibits.

The Commissioners, since the case was decided in the Supreme Court, have been steadily at work. They have a great many general expenses which must come out of that fund. First, the organization of the plan; second, the securing of an exhibit. The freight charges from here to Chicago will be no inconsiderable matter, and the maintenance of that exhibit at Chicago must necessarily cut a very large figure. There are six months that that exhibit must be cared for, and it will require a large number of men, and a great deal of expense there; and then the department's expenses, and the printing work, make quite a hole in this appropriation. To illustrate, the postage alone on matter that is going out of our office must be about $30 a week. You can see that something is being done in the way of correspondence and circulars that are being sent out.

All of these various departments, the leading ones, such as agricultu horticulture, viticulture, mines and mining, etc., the Commission ha considered the most important ones, and they have tried to estimate nearly as they could the various expenses that they will be compell to pay. They have thought proper to appropriate about $100,0 amongst these various departments.

There was a communication received from the Viticultural Commi sion at our last meeting, making some complaint that the amount money set aside for this department was insufficient. That is true every department in the State, but at the present time it was all th the Commission felt justified in setting aside. They felt that they mu hold a reserve fund, to meet any unforeseen expenses that might occu and that sum, while it is put down in our books, is not arbitrar If you don't want to use it, you need not; and if you want more y may get it, but that will be for the Commission to decide afterwards.

In pursuance of the request of many of you gentlemen, our Comm sion appointed Mr. McNeil as Superintendent of the Viticultural Exhil believing that he was the closest to you, and could carry out some pl for you. I don't believe there is any member of our Commission, wi the exception, possibly, of Mr. Rose, who is familiar with the det work of your exhibit; and believing with you, gentlemen, that Mr. M Neil could devolve some plan, his appointment was made. We beli he is a good worker. He seems to be active and energetic; and if fr your deliberations of to-day some plan is decided upon whereby Commission may be able to help you, and give an exhibition of the vi cultural interests of California at Chicago, in such a manner as will a credit to you and California, I am sure that the State Commission w feel disposed to help you in every way that they can. I don't kn that I have anything further to say. [Applause.]

THE CHAIRMAN: Is there any person present who wants to ask M Thompson any questions? I presume he is ready to answer a questions, if you want to ask them.

CAPT. THOMPSON: Mr. Chairman, I will state that this whole pro sition of an exhibit at Chicago from California, and everywhere else, that matter, is entirely an unknown problem. We have not the faint scintilla of anything to figure from. I write to Chicago almost ev day for information on some particular point, and I get either evas or unsatisfactory answers. They cannot say definitely at this time. am told that there will be a lot of new suggestions in the character exhibits, and things of that kind, and that information will be given this department later. I take it that it is very much the same there it is here; and that if anybody was to ask what the viticultural exhi of California will be, it would be impossible to answer. It depends the individual exhibitor; and the department at Chicago depends the general exhibitors. They tell me to go ahead, and they will ta care of everything when it gets there.

Now, if there is any particular point that any one wants informat about which I can give, I will be glad to do so.

[There were no queries.]

THE CHAIRMAN: I have no doubt Captain Thompson feels like we feel. We are beginners, and are working under disadvantages, and, I have said to some of our friends, we are wrangling around here. Wh we get to Chicago we will find competitors worthy of our steel, and

must combine to defeat them. When we get to Chicago we will find that we are not nearly as large as we think we are. Is the committee ready to report, Mr. Connor?

MR. BUNDSCHU: Mr. Chairman, I have to report that through some misunderstanding some of the members of the committee thought it was this morning at 8 o'clock that we were to meet, instead of last night, so we have only just had a consultation, and the report might have been formulated a little clearer than it is in some instances; so we have to ask your indulgence:

The undersigned members of your committee, appointed for the purpose of suggesting a plan of organization, recommend as follows:

1. That a general, harmonious, and artistic exhibit of the grape and grapevine and its products, consisting of dry, sweet, and sparkling wines, brandy, and raisins, etc., should be made in the California State Building at the Columbian World's Fair.

2. That a concentrated, classified exhibit should be prepared for the National Building for the purpose of competition and awards. County groups and individual producers should herein have as much distinctive recognition as practicable.

3. Said exhibit should include all apparatus and paraphernalia pertaining to the production, preservation, racking, and storing of wines, cellar utensils, cooperage, and distilleries.

4. The organization and collection of the exhibit should be managed by the Board of State Viticultural Commissioners and its Chief Viticultural Officer.

However, as the duties and labors connected with a faithful and judicious performance of this task are very exacting and complicated, we recommend the appointment of a committee, which, in conjunction with the Board of State Viticultural Commissioners and the Chief Viticultural Officer and Superintendent of the State Viticultural Exhibit, shall constitute the Viticultural Central Committee, on all matters pertaining to the wine grape and viticultural products.

5. Said committee shall be organized on the following basis:

Wines (dry and sweet)	7 members.
Brandies	3 members.
Sparkling wines	1 or 2 members.
Grapes and grapevines	3 members.
Cooperage	2 members.
Machinery, utensils, and distilleries	2 members.
Literature and statistics	3 members.

Which would form a total of twenty-one members in that committee.

6. The committee should be appointed by the Chair, with due consideration of a fair division of the viticultural districts, but principally with a view of concentrating its members within easy reach of San Francisco, so an Executive Committee may be enabled to establish a permanent communication with Superintendent McNeil or the officers of the Viticultural Commission.

7. When the amount of available space and appropriation of funds shall be definitely settled, the committee should work out its plans of operation in detail, submit the same to the California State Commission or the Chief of the Viticultural Department in Chicago, for approbation, and thereafter devise ways and means to successfully carry them out.

Respectfully submitted.

S. P. CONNOR.
A. G. CHAUCHE.
H. M. LA RUE.
D. D. DAVISSON.
E. C. BICHOWSKY.
CHARLES BUNDSCHU.

When we recommended, in No. 6, that the committee should be appointed by the Chair, with a fair division of the wine-producing districts, we thought, of course, that all the wine-producing districts could not be represented in that committee, so you will have to leave it to the discretion of the Chair whom to recognize, and we trust that any one, if he feels overlooked in the committee, will not feel slighted. In order to make a working committee we must center the committee as near San Francisco as possible. We have very great difficulty in our Commission on account of the members living so far away, and that is why we think that the committee must be centered near this city; it must emanate from San Francisco.

For this reason, as explained, we recommend that the Chair appo the committee.

THE CHAIRMAN: Gentlemen, the report of the committee is before y Have you anything to say on it?

DR. MINTIE: There are a number of recommendations there, an move that the report be taken up and acted upon seriatim. [Seconde

[Upon being put to a vote, the Chair declared the motion d carried.]

[Upon request the Secretary read over the report, and then read first paragraph. Upon motion duly made and seconded, the paragra was declared adopted.]

[The Secretary then read paragraph 2, which, upon motion duly m and seconded, was declared adopted.]

[The Secretary then read paragraph 3, which, upon motion duly m and seconded, was declared adopted.]

[The Secretary then read paragraph 4.]

MR. N. J. HAINES: Mr. Chairman, in our conversations and in remarks of the gentlemen, they all seem to show that space is one the great requisites. Now, I believe that the viticultural produ are the most important in the Exposition, and while the mechani devices, cooperage, and so forth should all be represented, yet the will crowd the other. That point is a most important one to vitic urists, but if we have to be crowded down into a smaller space, then Commission should decide who shall be represented.

THE CHAIRMAN: This clause gives it all the latitude that is necess

MR. CHARLES BUNDSCHU: We meant that all branches should exhibited in Chicago.

MR. N. J. HAINES: I have no objection to them, but they might co in and take half the space, and the consequence would be that the wi would be crowded and limited.

MR. BUNDSCHU: The committee has arranged principally for the wi and these others are more of an appendix.

[Upon motion duly made and seconded, the paragraph was decla adopted.]

[The Secretary then read paragraph 5.]

MR. H. M. LA RUE: Is the committee to take cognizance of all matt as well as the wine exhibits?

MR. MCNEIL: Wouldn't it be well to introduce a rule there detail the duties of that committee?

MR. BUNDSCHU: That would be a detail for this committee; that one of the details that come under the supervision of this commit that is to be appointed.

DR. MINTIE: I would like to amend that by adding the Board of V culture and the Chief Viticultural Officer.

MR. P. C. ROSSI: Why wasn't Mr. McNeil added to that committ Why can't Mr. McNeil be added?

DR. MINTIE: The amendment I wish to make is this: I want to in the name of Mr. McNeil.

MR. MCNEIL: In what connection; in conjunction with the Vitic ural Commission?

MR. DAVISSON: His name was not put there, and we didn't wish disturb Mr. McNeil in his duties. We were disposed to let them alo This committee would certainly be, in a measure, under his cont

This committee would advise and consult with him. He holds a higher position, and adding him to it would not be proper.

DR. MINTIE: You misunderstand me. Shall this committee act in conjunction with Mr. McNeil?

MR. DAVISSON: That is, in union with him.

MR. BUNDSCHU: I second the amendment.

DR. MINTIE: The amendment is to put in the name of Mr. McNeil.

[The Secretary then read the motion, as amended, to include the name of Mr. McNeil.]

MR. BUNDSCHU: What is the official title of Mr. McNeil?

THE SECRETARY: Superintendent of the State Viticultural Exhibit.

[Upon a vote being taken, the Chair declared the amendment duly carried.]

MR. BUNDSCHU: The raisin industry was left out inadvertently.

MR. C. J. WETMORE: And there is another industry. Table grapes should be in there.

MR. BUNDSCHU: You can add that. We were very much hurried.

MR. C. J. WETMORE: They consider it a separate industry.

MR. HAINES: I move to amend the section as read by adding "three members for the raisin department," and that will mean exhibits of grapes also, will it not?

THE CHAIRMAN: You can make it raisin and table grapes.

MR. HAINES: Will three be enough?

THE CHAIRMAN: Yes.

MR. HAINES: I move to amend by adding three more to the committee, to consist of raisin and table grape men.

MR. CONNOR: That committee should be either one more or one less, because it should be an odd number.

MR. HAINES: I will make it one more.

MR. LA RUE: I don't think it is good to get this committee too large; and as to even or odd numbers it makes no difference, for we never have a full meeting anyhow. If you have two or three from the raisin industry it will be all right. I move that two members represent the raisin industry and two the shipping and table grapes.

MR. HAINES: I accept that.

THE CHAIRMAN: The motion is that four more members be added to this committee, two on raisins and two on table grapes. The raisin men will have their own committee, and if they can work in conjunction with us we would be glad to have them do so.

MR. DAVISSON: The whole committee will act in conjunction with each other. These are merely representatives, just as we are representatives of the different interests of the different counties, but the work will not devolve upon one or two men. I look upon it in this way: that we are all interested in different exhibits. I know nothing about table grapes, but I am interested in all classes of grapes.

[The Secretary then read the numbers of the committee as it stood, being a total of twenty-five.]

[It was moved that the Committee on Wines be reduced from seven to five.]

MR. HAINES: There has been no second. We have two champagne manufacturers in California, and it is something that should be encouraged; and we have one in Santa Clara County; I move that the Committee on Wines be reduced one member.

THE CHAIRMAN: This committee has not yet been appointed, and tl can cover the ground that you are getting at.

MR. HAINES: I move that one more be added to the Committee Champagne.

MR. HARASZTHY: I don't see any necessity for that. The Commit on Wines is quite sufficient. The general idea is that the committ are expected to consult with portions of the industry. Now, three co consult just as well, and very likely one or two will do it; but ther no need of hampering the committee by adding more members to it.

THE CHAIRMAN: Your idea is to reduce the number of the committ

MR. HARASZTHY: I offer a substitute to that, that the committee five be reduced to three.

THE CHAIRMAN: Gentlemen, the motion is that the wine commit be reduced to three.

MR. HAINES: I am opposed to the motion. It has been contend that the whole committee will not assemble. Now, why should it reduced? I can see no reason whatever. I believe in giving every representation, but I cannot see any reason for reducing the committ We have many counties, and many men of prominence in them, an think the resolution as it stands should be adopted.

MR. BUNDSCHU: I think we have a big country in California to rep sent, and if it is reduced possibly the various interests will not be sa fied. I think the original motion should prevail.

MR. WEHNER: I think, myself, that seven members would be sufficie but I would strike out viticulture alone, and have the committee seven for wines and brandy and viticulture.

MR. HAINES: I move to strike brandy out of the committee, a increase the number to nine.

MR. BUNDSCHU: I object to striking out brandy. Our brandy inter is large, and we must do something to help it. I think the three me bers for brandy should remain. It is distinct from the wine industr

DR. MINTIE: There is no reason why the Chair should not appoin representation of the brandy interest. There might be even two three named in the seven.

[The Chair then announced that the motion is to reduce the co mittee from seven to five, which, upon being put to a vote, was lost.]

MR. HAINES: I call for the original motion.

[The Chair then put the motion that the committee consist of: wi (dry and sweet), seven members; brandy, three members; raisins, t members; table grapes, two members; grapes and grapevines, th members; cooperage, two members; machinery, utensils, and distiller two members; literature and statistics, three members; making a to of twenty-four members.]

[Upon motion duly made and seconded, the paragraph was decla to be adopted.]

[The Secretary then read the sixth paragraph.]

MR. HAINES: Mr. Chairman, there is no need of that section; it cumbersome—not intending any disrespect to the committee—but will appoint men who will have the interest of the whole State at hea still, I move its adoption.

[Upon motion duly made and seconded, the paragraph was decla to be adopted.]

Mr. Haines: Mr. Chairman, I move the adoption of the report of the committee as a whole as amended.

[Upon motion duly made and seconded, the report of the committee as a whole was declared to be adopted.]

Mr. La Rue: I would offer a suggestion that is very important about the appointment of this committee. I suggest that the Chair announce them hereafter. I don't see any necessity for making the appointments to-day. I move that the Chair take all the time necessary to appoint this committee.

Mr. McNeil: Mr. La Rue is all right on that, but there is one thing he must take into consideration, and that is about the delay of this work. We have got only about forty days in which to do it, and the Director of the World's Fair wants those applications all in by July 1st. The committee has to do that.

Mr. Bundschu: I make an amendment that the Chairman be given three days' time to appoint that committee.

The Chairman: I think I can make it by this afternoon; at any rate, as soon as I can. It is not necessary to put that as a motion. Now is the proper time to introduce resolutions, if there are any to be offered.

Mr. C. J. Wetmore: I believe there is one here.

Dr. Mintie: I believe this is the proper time to enter upon another matter, and to discuss the proposition, and if it is thought advisable, to have a motion introduced as to the sense of this convention, with reference to making an exhibit at this so-called "Dress Rehearsal" in San Francisco next January. In order to bring the matter before the convention, I move that it is the sense of this convention that the Viticultural Exhibit be shown at that dress rehearsal.

Mr. Haines: There are two sides to the case.

The Chairman: Was there a second to the motion?

[The motion being duly seconded, the Chair announced that it was open for discussion.]

Mr. Haines: Now, I will simply present the two sides of the case, and one is that the viticulturist has to make two exhibits instead of one, and it takes a great deal of time. Another is that if we have anything with which to astonish the world, the exhibitors will find it out all over the country. I believe furthermore, that it would not benefit the State at all. I don't think the people generally from all sections of the State would go into it. It might benefit San Francisco. I don't know whether I am opposed to it or not, but if I were exhibiting I don't know whether I would like it or not.

The Chairman: Mr. Turrill, have you anything to say?

Mr. C. B. Turrill: I would say, Mr. Chairman and gentlemen, that at a convention of the county organizations, recently held in San Francisco, it was decided that this county organization would do everything that it possibly could to further this idea of a preliminary World's Fair exhibit in this city. There was but one question raised—one important question—and that was the matter in conflict of dates. This display in the Mechanics' Pavilion was first arranged to take place this fall. The Directors of the World's Fair from some of the sections lying around Sacramento came to the city and consulted with the Commission and the Directors of the Mechanics' Institute. On the strength of their representations, that if this preliminary exposition was postponed until January, they would all work earnestly and would have no objec-

tion, and do all in their power to assist in making it a successful disp the preliminary fair was then postponed, so that the great objectio that line has been removed.

Now, as regards the objections that the gentleman raised. Of co one of the main points that the Commission had in mind in arran for a preliminary fair, or, as it has been named, the "Dress Rehear was that an opportunity might be given for rearrangement or redi bution of the different exhibits. It has been my experience (a think it is that of you all, that the second time you set up a dis they understand exactly what you are going to have) that the se arrangement is always better than the first—always more complete, you are better satisfied with it, and can add things that have been gotten. That was the prime object of having a preliminary exhib this city. There is, of course, some point to the suggestion that the tleman raised, that if a display is made here, and if the papers men it, as we want them to do, somebody may go us one better. I thin second thought, that is only so much to be said in favor of the e prise; for if we take into consideration that the fair opens in Chi in May, the Exposition in this city will close so as to leave tim the transportation of this exhibit and its installation in the Calif Building, and such as may be added to it in the main buildin Chicago.

After the opening of this fair the viticulturists of this State will nothing to fear from any other section in going them one better. European exhibitors and those of other States will have done all will do prior to the time that we will make this display here, an may know, perhaps, what they are about to do. The going one b will be confined between the sections of this State, and that, I th will be a good thing, as each section will be spurred on to do more it might do otherwise.

You have provided for the appointment of a committee, the repo full and complete, and it is one of the most important steps that has taken in the State looking towards representation in Chicago. committee, as they prosecute their work, will find that one sectio another may be a little backward in attending to this affair, and will give them an opportunity to show exactly what is going to be d So far as your wines are concerned they will be taken from your s already on hand, and as one producer after another goes through exhibit in the pavilion he will say at once: "I have neglected to do that I should have done," and he will go home and send some more or some raisins. I think the upbuilding of your exhibit in comp ness will offset any objections that may be made in any other direc

As far as the duplication of your exhibit is concerned, as I unders the resolution which has been introduced, it will not affect the exh made by the individual exhibitors, which are going into the main for competition. There is nothing which will prevent the indivi from exhibiting in the Mechanics' Pavilion. As I understand, the in tion is that the State shall exhibit as a whole.

It is very important that the exhibit shall be set up where it ca criticised by you gentlemen. Then there is another point. Yeste Mr. Wetmore raised the question of the object of this Expositio Chicago. There is no question that our wines should be made b known at home. Here is an opportunity of accomplishing that

greater scale than has been done heretofore. I think, therefore, that everything points in favor of making as complete an exhibit as you can in the Mechanics' Pavilion.

There are some things that you may want to suggest, but those will probably be only trivial matters.

I want to say one word in regard to the management of this Exposition. The Mechanics' Institute has decided to allow this fair, or to allow the use of their pavilion this year—it is now postponed to next year—by the State Commission for this preliminary Exposition, and their regular Mechanics' Fair will be abandoned this year. An arrangement has been made by the Commission for a division of the profits, so that the Institute will receive a rental for the pavilion, and the management of the fair will be almost entirely under the Commission, the Mechanics' Institute agreeing that the State Commission should get the benefit of their twenty-six years' experience in regular Expositions.

The State Commission found that it would be important for them to use no money for this work, as it has been impossible for them to appropriate money for other purposes, and all the expenses of this Exposition will be paid from the Exposition.

I don't know that it is necessary for me to go into this matter any further. I will say that I have opened an office in the Flood Building, and will be glad to see you, and that I want to work thoroughly in harmony with you all, as I have the assurance of Mr. Wetmore and Mr. McNeil that we shall do so.

I have had some little experience in this line, and also in the matter of the viticultural work of the State, and I have already suggested to Mr. Wetmore a number of things that I think will be within the province of the California State Viticultural Commission. Those matters will of course be brought up at a meeting of that Commission at their next semi-annual convention. I think this is an opportunity that only comes to us once in a lifetime, and I think that we ought to endeavor to make our Exposition established in the California Building in Chicago a grand success, and show what we can do. We realize all the obstacles that the viticulturists have had to contend against formerly, and it is only by letting the world know what we have done and can do that we can hope to mend the condition of the viticultural interests. It is only by educating our own people to the fact that we raise as good wines in California as in any other part of the world that we can do so. We should commence right here educating our Californians. They need it as much as, possibly, the people east of the Rockies; I am inclined to think even more so, and for that reason we should make as full a representation as we can.

Mr. C. J. Wetmore: Probably that question should rightly come before the Executive Committee, which has just been appointed. There might be some portions of the viticultural exhibit that could be repeated there, and some that could not. When the first meeting of that committee is held, the question can come before them.

Dr. Mintie: I knew there would be a discussion, and it was with a view of giving that committee the arguments, pro and con, out of this convention, and to give them the benefit of these ideas, that I thought proper to introduce the motion. I, myself, am decidedly in favor of the exhibition at the Mechanics' Pavilion. There is no possibility of any one going us one better, because this is distinctively Californian. It is

so near the time of the Exposition in Chicago that our compet can't get our ideas in time, and it seems to me that if there is an E sition, as there will be, and the great viticultural interests of the S are not represented, it would look as if we had surrendered. Bes this kind of an exhibit is not perishable, and it can be done with a g deal of credit. In addition to that, it will give us an opportuni seeing how others work; the ideas of a hundred men are better those of three or four. In addition to that the exhibit in Chicago be more harmonious, neat, and complete than if left until the tim the exhibit in Chicago. Consequently, I am in favor of this mo and we don't say that "It shall be," but that "It is the sense of convention that it be." That is not final. If it should be found that it is impracticable, the reasons can be given by the Execu Committee. I want simply to find out whether it is the sense of convention that an exhibit of that kind take place.

A VOICE: I move to amend by referring to the committee after it have been appointed.

DR. MINTIE: Some people might take a certain way, and go us better. If we go into this enterprise with the idea that others wil us one better, we are losing hold. We ought to go in with the idea no one will do better, and we will win. I know that the grape indu and the wine industry of California can compete easily with any o State if we go into it with the right idea. The idea of any other S excelling the State of California in its wine and grape industry t is ridiculous, provided we do our work thoroughly.

MR. WM. WEHNER: I care about the San Francisco Exposition, a desire to present some points. I remember having been Chairma the committee when Santa Clara took the prize. Let the counties in, and they will not know what they are competing against until get there. If we have a competition here, and one county comes in doesn't know what the other counties are doing, and they come in find they are not in it, they will say, "Oh, pshaw, I don't want t Another thing: In Chicago they may want to put up vats that can taken down here, and they may want machinery and such things cannot be presented here. However, if it is the sense of the Com sion, I will be most happy to see such an Exposition in San Franc

MR. F. A. HABER: There is one question: Is it understood that dress rehearsal will be specially to represent all the viticultural i ests in this State, and no other exhibit, at the Mechanics' Fair? question is whether this exhibit will be specially to represent the cultural interests of California, and nothing else.

MR. TURRILL: I think it is right for me to answer the gentle The preliminary Exposition at the Mechanics' Pavilion will be a vention entirely Californian. This is not a Mechanics' Fair, nor w be an exhibit entirely of viticulture; but it will consist of those art in all the various departments which go into the California Buil with the addition of as many articles as are going into the buildin competition.

MR. HABER: Mr. Chairman, I would like to know who is going t the money to be derived from that. I want to know, for the reason I think that the money received from this Exposition should be a to the special funds to increase the donation by the State. There o to be quite a large amount, if the fair is properly conducted. I w

like to know where that comes in. Some of the large growers who are bottling and selling their wine, if they intend exhibiting there (and I believe it is the intention of most of them), can't go there without expending from $400 to $500. That ought to be applied to the fund, to increase the fund that is going to be spent in Chicago.

THE CHAIRMAN: I don't believe the motion has included any restitutions from the Commission at all. This is the first time I have thought of it.

MR. TURRILL: That is a matter which rests entirely, of course, with the State Commission. Mr. Scott is Chairman of the State Commission. The portion which goes to the State Commission will be used by the Commission in paying the additional expenses. The money which goes to the Mechanics' Pavilion is in the nature of payments for the building, and we will have the use of that building for some time. The money which goes to the Commission will be used in connection with the expenses of the work, and I am satisfied that the Commission will be very willing to appropriate that to the industries which are represented in the Exposition.

MR. HABER: I asked the question for the reason that it appears that the sum that has been apportioned for the viticultural interest has been a very small one, and it certainly must be increased, or no proper exhibit can be made. I perceive that every State in the Union will have a larger sum to work upon than California, in that direct line, because we must put ourselves on a high horse, and imagine that we are everything. The people in the East take more pride in their five-acre vineyards than many of us do with two or three hundred acres. They are very proud of their vineyards; they are very different from the men in California.

DR. MINTIE: The reason that I didn't put into that motion anything about the proceeds of the fair is because we can't control a cent of it. Here is a resolution made by the California Commission to display the California exhibit as a whole. Now, it is not compulsory upon any county in this State or any organization to appear there, but can we afford, as viticulturists, as separate counties in such an exhibit of the State, to stay away? The remarks that Mr. Haraszthy has brought out will perhaps have this effect, and I am glad they have been made. We might, perhaps, appoint a committee, if you choose, to go to the State Commission and say: "Here, everybody in this State knows that the viticultural appropriation has been very small—smaller than any other appropriations that you have made. If there are profits in this Exposition we, as viticulturists, want you to correct a mistake that has been made, and give us more money." But we have nothing to do with the receipts. We have only to find as to whether it will be better for us to exhibit there, and that is the only question that can possibly come before this convention.

MR. HARASZTHY: Following up that line of thought, I think it will be in order to introduce a resolution that a committee be appointed by the Chair to wait upon the Commission and see what can be done in the matter.

MR. SCOTT: I have a suggestion to make concerning this dress rehearsal. Mr. Haraszthy tells us that they are going to give us a very small appropriation. I offer as an amendment that we assist in this dress rehearsal, provided they give us some of the funds to assist in making a proper exhibit.

[Dr. Mintie stated his resolution to be that it is the sense of this convention that the viticultural interests of the State, to be represented in Chicago, be exhibited here in the dress rehearsal.]

THE CHAIR: Is there any amendment?

MR. WETMORE: Mr. Scott offered an amendment that we encourage this dress rehearsal, provided they give us a certain portion of the funds towards the exhibition in Chicago.

DR. MINTIE: I would like to speak on that motion. It seems to me that it is not practical. The viticultural interest is only one interest. If we go on record and say, "If you give us so and so," every other interest in the State will follow. I say let us go there and appoint a committee and say: "We are standing in with you, and we want you to give us more money if you can."

MR. SCOTT: That has already been done.

DR. MINTIE: What has been done?

MR. SCOTT: They have been asked, time and again, to give us more money.

MR. HARASZTHY: I would like to inquire if the exhibitors at the dress rehearsal will have to pay their own expenses?

DR. MINTIE: I can answer that such exhibits as are exhibited by the State Commission they will pay the freight upon them, but any private or even county exhibit, I understand, outside of the question of freight, will have to pay the expenses.

[The amendment, and second thereto, were withdrawn. Thereupon the original motion was voted upon and declared duly carried.]

MR. HARASZTHY: Mr. Chairman, I make a motion that the Chair appoint a committee of three (and exclude myself; I don't want to be included in that committee) to wait upon the Commission to show them that they will derive some benefit from this Exposition that we are going to make at our expense, and ask for some help from these funds for the industries represented. I think this committee should be able to show them that it is to the advantage of the State to increase the appropriation.

MR. CONNOR: I think there is a resolution in the hands of the Secretary that will cover this whole question.

MR. HARASZTHY: I will delay this motion and allow the resolution offered by Mr. Wehner to be read.

[The Secretary then read the resolution offered by Mr. Wehner, which is as follows:]

Resolved, That the appropriation of $6,000 for viticultural purposes set aside by the State World's Fair Commissioners, is entirely too small with which to make a creditable display of viticultural products.

Resolved, That in view of the importance of viticulture in California, of the number of people engaged and the amount of capital invested in the industry, and the important part that viticultural exhibitors will be called upon to take in preparing a creditable display in the California Building, the State World's Fair Commissioners are respectfully but urgently requested to increase the amount set aside to at least $12,000.

MR. WEHNER: In connection with this as a motion, I would ask Mr. Wetmore to state to this meeting what has been done in order to get them to increase the appropriation.

MR. C. J. WETMORE: I will state that at the last meeting of the World's Fair Commission we sent a letter to them, stating these facts that are embodied in this resolution here. That letter can be read showing what was done. To that letter we received no answer from the

mittee. I understand that it has been filed. Let the Secretary read the letter.

MR. BUNDSCHU: Mr. Wetmore has stated an occurrence of two weeks ago. Three months ago the State Commission addressed the Board of State Viticultural Commissioners, asking what we would think fair as an appropriation. Our claims were put in. After taking out $100,000 for expenses, we wanted one fifth of the remainder, or $40,000. We have received no reply since. We were never invited before the Commission, but a short time ago we received a notification that $6,000 was put aside for our purposes. That is as far as I know the history of this matter. We protested, and our letters have never been answered.

MR. LA RUE: As long as the State Commission has declined to answer the communications from the State Board of Viticulture, I think this is a good opportunity to do something. I think we should first demand more money; but whether we should make an exhibit in the California Building, is another question. I suggest a division of the question.

[It was then moved to amend the two resolutions by combining them in one, allowing Mr. Haraszthy's committee of three to be appointed by the Chair to carry these resolutions to the Commission.]

MR. HARASZTHY: I rise to a point of order.

THE CHAIRMAN: State your point, Mr. Haraszthy.

MR. HARASZTHY: My motion was to divide the question so that we could act upon it. I am in favor of making a demand for more money, but I am not in favor, if they will not give us more money, of saying that we will not make an exhibit.

DR. MINTIE: The motion that we have just passed—let us see what position we are in. We have now passed a resolution that it was the sense of this convention that we appear at this dress rehearsal. We have an Executive Committee, and it is suggested that we have a committee to wait upon the State Commission to find out whether they will give us any more money. If they don't receive this Executive Committee with proper consideration, and if they refuse to make any concessions at all, and if that Executive Committee, on account of that, says "Gentlemen, we can't make an exhibit in the Mechanics' Pavilion," I don't think that there is a member of this convention that will not say that this committee has done right.

MR. LA RUE: I think the resolution is that we will not exhibit in the California Building in Chicago, and not in the Mechanics' Pavilion.

MR. WEHNER: Six thousand dollars is not sufficient. Where are you going to get the rest of the money?

DR. MINTIE: This refers to the California exhibit.

MR. WEHNER: In the California Building?

MR. C. J. WETMORE: I think the Secretary should read the letter first that was sent to the Commission.

THE SECRETARY: This letter was written by Mr. Wetmore and myself after a meeting of the Executive Committee, and to this letter we have received no reply.

[Here the Secretary read the letter, which was as follows:]

World's Fair Commission, San Francisco:

GENTLEMEN: Your letter of the 29th ult., in which you state the amount set aside by your Board for special displays, has been received.

Quoting from the letter, the amounts are: Agriculture proper, $10,000; Horticulture proper, $12,000; Fish and Fisheries, $5,400; Viticulture, $6,000; Mines and Mining, $15,000.

In the opinion of the Board the amount you have set aside for viticulture is wholly inadequate as compared with the display that must be made.

At Chicago the viticulturists will be called upon to make a wholly unique ex Other States will have all agricultural products. Other States will have products o orchard, the fisheries, and the mines. But we will have no competitors worthy o name in the products of the vine—at least as far as concerns the United States. display of wines, brandies, raisins, table grapes, and other viticultural products w absolutely without duplicate from this country.

This Board has already expressed the belief that there should be set aside one fi all the funds remaining in your control after deducting cost of building and adm trative expenses. We believe that we are entitled to this, not only on account o novel display that we shall have to make, but because the capital actually invest producing these home products warrants it.

The total taxable real property of the State, as reported by the State Board of E zation, is in round numbers $690,000,000. The actual value is not far from $1,500,00 There are in this State to-day about 200,000 acres of old and new vineyards. The about 140,000 acres in bearing. The total capital invested in wine, raisin, and grape vineyards, bearing and not bearing, in wineries and wine-making machine cellars and cooperage, in wine cellars in San Francisco and in the East, in distil and special bonded warehouses, in raisin-packing houses, in cooperage establishm directly engaged in making cooperage for wine and brandy, and in other establishm directly dependent on the viticultural interests for their support, is probably not of $200,000,000.

This is a very moderate estimate, inasmuch as those connected with this ind must have a larger capital involved for the amount of business done than any agricultural calling in the State. We have more capital invested, and our produ equal in value to that of the horticulturists. It is greater in value than that o mines, and far greater than of the fisheries.

We have endeavored to obtain an estimate of how much the counties will set asid viticultural display, but thus far it would appear that no division of their fund been agreed upon in any instance. We have, however, received numerous letters gentlemen connected with the industry, giving their views upon the appropriatio aside by you. From these letters we take a few extracts:

W. W. Lyman, St. Helena: "I was much surprised to hear that the State World's Commissioners should have made such a small appropriation for viticulture. I tainly stands on an equal footing with horticulture, and should therefore receiv same recognition from the Commissioners as the latter."

Frank A. Kimball, National City: "The mining exhibit with everything arranged classified, almost no work to do except to pack and ship, has nearly three time appropriation made for the viticultural exhibit, when the cost cannot be one thi much. I am in favor of every industry having an appropriation based upon its im tance and merit."

Capt. H. W. McIntyre, Vina: "I deem the appropriation for the viticultural pur for the World's Fair wholly inadequate, and altogether disproportionate to the vit ural interests of our State."

H. W. Crabb, Oakville: "Viticulture ought to have an appropriation of $12,000. I be in a grand State exhibit only."

These may be taken as indicative of the feeling that exists in the different sectio the State in regard to this matter.

We would respectfully request you to increase the appropriation to $12,000, w would in some degree be commensurate with the importance of the industry whic have the honor to represent.

(Signed:)

GEORGE WEST, Chairman,
I. DeTURK,
CHARLES BUNDSCHU,
E. C. PRIBER,
Committ

WINFIELD SCOTT, Secretary.

MR. HARASZTHY: Mr. Chairman, this shows what you have to do. shows that you want a committee right there.

[The motion to divide the resolution before the house was then onded.]

THE CHAIRMAN: Mr. La Rue's motion was to divide the resolutio

MR. LA RUE: That we consider that portion of the question i pendent of the other. I want to consider the question, and if we ad the first part, then we can take up the second part.

[The motion being then put to a vote, was declared carried.]

MR. LA RUE: I move the adoption of the first part of the resolut

[Seconded.]

[The motion being then put to a vote, was declared carried.]

[The Secretary then read the clause which asked for an increase of the appropriation to $12,000.]

[A motion was duly made and seconded to that effect, and, upon being put to vote, was declared carried.]

[The Secretary then read the clause: "And if the Commissioners refuse to increase the appropriation, as requested above, no collective exhibit in the California Building be made.]

MR. HARASZTHY: I move as a substitute that a committee of three be appointed by the Chair to interview the State World's Fair Commission.

[No second.]

[Moved and seconded, that the last portion of the resolution be stricken out.]

MR. CONNOR: I would make a suggestion here, and afterwards I will put it as a motion, that we leave this clause to the committee. It is a question whether we can make a respectable display unless we can get more money.

MR. WEHNER: I would like to know what we are going to do if the Commission refuses to increase the appropriation.

THE CHAIRMAN: We will stay at home, I suppose.

MR. WEHNER: Then you might as well say so.

THE CHAIRMAN: The World's Fair Commission is overwhelmed with demands for money, but if we let them alone they will do well by us, I think.

MR. WEHNER: Why did they give horticulture $12,000?

MR. SCOTT: I can answer that. Mr. Hatch is a member of the Commission.

[The motion to strike out the last clause, having been duly voted upon, was declared carried.]

MR. E. W. MASLIN: Mr. Chairman and gentlemen, I have a resolution to offer, and it will be hardly necessary for me to speak of the necessity of California being represented in the Executive Department of that fair.

[Resolution read as follows:]

Resolved, That the application of Hon. H. M. La Rue, of Sacramento, for the position of Chief of Viticulture at the Columbian Exposition, under Hon. J. M. Samuels, is heartily indorsed, and that we, the viticulturists of the State, in convention assembled, respectfully urge Director-General George R. Davis to appoint Mr. La Rue at the earliest possible date.

MR. HARASZTHY: I will allow my resolution to wait until this is decided.

[The resolution being duly seconded, upon being put to a vote was declared unanimously carried.]

MR. BUNDSCHU: I propose that the following telegram should be sent to General Davis at Chicago:

To GENERAL DAVIS, *Chicago:*

Wine growers and wine makers assembled in convention to discuss Columbian World's Fair matters request that the claims of California for Chief of the Viticultural Department should be recognized, and urge the early appointment of Hon. H. M. La Rue, of Sacramento, as the unanimous choice of all parties at interest.

(Signed:) I. DETURK, Chairman.

[This being put as a motion, and duly seconded, was, after vote, declared carried, and the Secretary was instructed to send the telegram during the noon recess.]

MR. HARASZTHY: I have made a motion, and it is before the meet that a committee of three be appointed to wait upon the Commissio and see what further appropriation they can secure; to show the C missioners that if they have no money from the appropriation alr made by the State, that they should give us a larger appropriatio the money procured from this dress rehearsal; to show them that absolutely necessary; and to state that our appropriation shoul increased.

[The motion being duly seconded, was, after vote, declared carri

DR. MINTIE: I suppose that the Chair will appoint the committe

MR. HARASZTHY: Yes, sir.

DR. MINTIE: I would suggest the name of Mr. La Rue.

MR. LA RUE: I think it would be better to suggest the names of pe more interested in it; for instance, Captain McIntyre and Mr. Harasz and others.

MR. HARASZTHY: I must decline being on that committee. I been too often to see this Commission. I would look a little stale, look as if I was trying to run the Commission.

THE CHAIRMAN: It would be very improper for the Chair to app anybody else than yourself.

MR. HARASZTHY: There is Dr. Mintie, and Mr. Bundschu, and m others.

MR. HAINES: I move, sir, that this committee consist of Mr. Ha thy, Mr. La Rue, and the Chairman of this convention.

[Upon the motion being seconded, Mr. Haines proceeded to put motion to the house.]

THE CHAIRMAN: The motion is out of order, for a motion has alr been carried that the Chair appoint.

MR. HAINES: I move to reconsider the clause wherein the app ment of this committee was given to the Chair.

[Cries of "No, no."]

DR. MINTIE: I suggest that the Chairman of this convention be a to the committee of three.

[This being afterwards made as a motion, and duly seconded, vote was declared carried.]

MR. DAVID WOERNER: Mr. Chairman and gentlemen, I have ma study for some time as to what way I could assist the viticultural inte of California at the Chicago World's Fair Exposition, and I would to have the committee show me in what way I can best do this. only thing I can do is in the making of casks. In the matter of cooperage we can stand alongside of any European nation, or the in the excellence of work and facilities for carrying on that work.

THE CHAIRMAN: There is a committee already appointed, and t will be a committee appointed on cooperage. That is already prov for.

MR. WOERNER: I ask that Captain McIntyre or Captain Niebaum appointed upon that committee.

MR. WETMORE: I will state before we adjourn that this afternoo will take up the subject of the condition of the market. The Secre has about forty or fifty letters to read from different portions of State about the frost, and then Mr. Haber will make some remark the storage of wine.

MR. MCNEIL: I hope, as soon as possible, to receive as many of the answers from the different exhibitors as possible.

[At this point the convention took a recess until 2 o'clock P. M.]

AFTERNOON SESSION.

The Chairman called the meeting to order.

THE CHAIRMAN: Gentlemen, the Secretary has a few communications to read, and after that we will discuss the frost question, the crop prospects, and so on.

The Secretary then announced that he had received a letter from Governor Markham, regretting his inability to be present, and also a telegram from Mr. J. DeBarth Shorb, sent from his home, stating that illness prevented him from coming to the convention.

THE SECRETARY: Now for the crop reports. I have here about sixty extracts taken from letters which were sent in reply to letters from Mr. Wood and myself. I will read them:

SANTA CLARA COUNTY.

N. J. Haines, San José.—About one fifth damage by frost. Present weather is favorable for coulure.

H. A. Merriam, Los Gatos.—I have nothing new to report in this matter, the foothill section having escaped damage from the frost almost entirely.

A. H. Wood, Cupertino.—In this immediate vicinity there is little or no apparent damage to vines from frost, but lower down the valley nearly all the vineyards are damaged, and some of them severely. I estimate the loss from frost at from 20 to 25 per cent. Prunes also are dropping badly.

John T. Doyle, Menlo Park and Cupertino.—The young vines not yet in bearing are cut down by the frost. No damage to our vineyards. I hear that Mr. Portal, and others farther down in the valley, are badly cut by frost.

J. C. Merithew, Cupertino.—Since my last report I hear of more damage by the frost, but as I have not had time to look about, I cannot at this time give a correct estimate. Last night, May 11th, was cold and frosty, and I expect to hear of more damage. On the west side of the valley the vineyards show but little damage, but the blossoms are looking badly; they are all turning red, so even here in the warm belt we now expect a short crop. All kinds of fruit will be short.

Solis Wine and Fruit Co., Gilroy.—We were not hurt in this locality by the earlier frosts of recent ocurrence. The damage reported in our last was done by what you refer to as a second visitation, which was the time we suffered. There is, therefore, nothing further to report, and we have no reasons for changing our opinion as expressed to you in our last as to the extent of the damage. In the lowest spot on all our ranch the thermometer (self-registering) showed a temperature of 25° on the worst night of this spring.

E. E. Meyer, Wrights.—The vines are in good condition. No damage was done by frost or rainy weather with me, or any of the nearer neighbors. The outlook is for a good crop.

R. Heney, Jr., Mount Cabernet Vineyard, Cupertino.—There was frost in the valley, but I do not know how much. I should judge that not more than 5 per cent was damaged. The foothill vineyards escaped.

ALAMEDA COUNTY.

A. Duvall, Livermore.—In the report made lately I wrote "no damage by frost." Since then the situation of the vineyards has changed. The frost of late has damaged the crops at least 25 per cent. It is quite too early to judge the exact damage, or what will be the next crop.

John Crellin & Sons, Livermore.—One fourth of the crop, at least of the crop at Ruby Hill, is gone. The greatest damage was done to the low-lying vineyards, between Pleasanton and Livermore.

Chas. C. McIver, Mission San José.—The frost has not injured a vine in my vineyard, and I have not heard of any damage whatever in this district.

H. B. Wagoner, Livermore.—The damage by frost in this locality will average 25 per cent. The outlook now is for a light crop, more especially as the two preceding crops have been heavy on Zinfandel (which constitutes the bulk of the crop), while the present crop of that variety, everywhere uninjured by frost, is making a poor showing.

SONOMA COUNTY.

William D. Sink, Cloverdale.—The vines in this locality are damaged by frost 10 per cent and by hail 15 per cent, making 25 per cent, but in reality we cannot judge the damage yet, as we have had no fair weather for ten days. Some of the vineyardists set

the damage from one third to one half, but I think one fourth about the dan Prunes are badly hurt by hail. Some vines are completely stripped of their foliage, look as if the grasshoppers had been at work.

I. DeTurk, Santa Rosa.—Low-lying vineyards are cut short one half. Vineyard higher ground are damaged but little.

D. D. Davisson, Sonoma.—The damage done to the grape crop in the Sonoma Valle frost does not exceed 2 per cent. This report applies to all that portion of the Son Valley lying south of the Los Guilicos district.

E. G. Furber, Cloverdale.—After interviewing the principal grape growers from Cloverdale district, I have come to the conclusion that if we get one half of our u crop it will be fully up to our expectations after such long-continued cold, frosty, rainy weather. Many of us anticipate the droppage of one half of what still remai there is no immediate change in the unprecedented weather.

Dresel & Co., Sonoma.—The frost in the lower part of Sonoma Valley came in w and it was not a general frost. Some vineyards escaped entirely, while others suf to the extent of 30 to 40 per cent. The entire loss to this section may be estimat about 15 to 20 per cent. We have now a cold northwest wind, which, if it subsides night, may bring on more frost. The vines look fair and promise a good crop, ba accidents.

Guy E. Gross, Santa Rosa.—In compliance with your request of May 9th, allow r make the following report: In traveling over our grape sections of Santa Rosa Va Los Guilicos Valley, and the Rincon, I will estimate that one third of the grapes a the lowlands, and two thirds on up and hill-lands. The frost has damaged the low vineyards at least 75 per cent, and the hill-lands—while some vineyards in favo localities escaped entirely—have nevertheless suffered a damage of 25 to 33 per With many vineyardists I am of the opinion that there is not now more than one to a two-thirds crop in sight. Jack frost made another visit this morning (May 1 but I have not yet learned the extent or severity, but I think it was light. Prune less than a half crop in this county.

Ferdinand Albertz, Cloverdale.—Around Cloverdale, and River Bar, and Upper Creek the vineyards are damaged a great deal. On the foothills not so much; but I not be able, until after the blooming, to state the exact damage the frost has done.

The American Concentrated Must Co., by Baron A. von Schilling, Geyserville.—Answ to your circular, we are pleased to state that we have had no frost worth mentio since our last report. Thus no damage is perceptible. The crop so far is very favor and everybody is taking a deep interest in the welfare of their vineyards.

F. Korbel & Bros., Korbels.—The frost has done 15 per cent damage in our locality.

E. E. Onlevy, Superintendent for Kohler & Frohling, Glen Ellen.—In reply to your c lar, I must say that in this part of the valley, and within a radius of several r the crop outlook has not been materially changed by the last frosts. The vines healthy and are in good condition, and I believe that (in our neighborhood) this y crop will be nearly as heavy as last year's.

James Finlayson, Healdsburg.—The late frosts have done no damage to grapevin far. They were not far enough advanced in this district.

James A. Shaw, Wildwood, Los Guilicos.—Since receiving yours of the 9th instant, I made it my business to see for myself what damage has been done by the frost. I that about eight miles up the valley the frost has been more severe than in this imr ate vicinity. There, I should say, they have lost two thirds of the crop, with the e tion of the Guilicos Vineyard (Mrs. Hood's), which is scarcely hurt at all so far, alth the two adjoining vineyards have lost about 25 per cent. The vineyard next to m about a half crop, while I have lost one third. On one portion of my vineyard, which I took one hundred tons of grapes last year, I doubt if I could get more twenty tons this year. This of course is the worst frosted portion of the vineyard far as I am able to judge, the grape crop this season would have been a light one, re less of frost. The strangest feature of this year's frosts is that the vineyards which ordinarily suffered the worst in former years have escaped, while those never atta before are badly injured. The vineyard on the hills back of me, at least two hun feet higher than I am, has suffered, something never known before, and it is quite a vineyard in the country. Since writing the above I have been through other viney as well as my own, and find that some of the vines, especially the Gray Riesling, been attacked by another trouble. The branches have turned a dirty brown, a believe will all fall off. This is caused, I suppose, by too much rain. The weathe been so cold that the vines have not grown an inch in three weeks.

P. C. Rossi, Italian-Swiss Colony, Asti.—There is nothing to report as regards frosts my report in your last paper. But the growth of the vines has been greatly retard the cold and wet weather. They are no further advanced than over a month ago.

NAPA COUNTY.

F. B. Mackinder, editor "Star," St. Helena.—At a meeting of the Wine Growers' U on the 7th, the damage done by the late frosts was thoroughly discussed. It wa universal opinion that in the heavy-bearing valley vineyards, from 70 to 75 per ce the prospective crop has been destroyed, and on the hillsides and on Howell Moun where heretofore frosts have been unknown, at least 35 per cent has been destroye what is always a light crop. Our valley vineyards bear from eight to fifteen ton acre, good crop years, while hill vineyards only yield from four to six tons. So you

see that the crop of 1892 will be hardly worth gathering, especially so unless there is a material advance in prices. The meeting Saturday was very largely attended, and the following resolution was unanimously adopted:

"WHEREAS, The general frosts which have visited this State have reduced the coming crop of grapes to a fraction of its usual amount; and whereas, the stock of wines now on hand in the producers' cellars is insufficient to supply the trade for the present year; therefore be it

"*Resolved*, That it is the sense of the viticulturists of Napa County, in mass meeting assembled, that the price of sound wine of the vintage of 1891 should now be raised 33⅓ per cent, and to that end we urge all producers to hold their wines at the most recently named figures."

L. Kortum, Calistoga.—The damage done by frost in this vicinity, so far, is estimated at from 66 to 75 per cent, while valley vineyards in some parts are ruined. Usually most of the vineyards on the higher localities escaped with little damage. It is very difficult to make a fair estimate until after the blossom.

S. Brown, for James H. Goodman & Co. Vineyard.—I, with others last week, after all the severe frosts, examined a large portion of the vineyards in this valley, and, in my judgment, this valley will not produce one half the crop of last year, and it may be much less.

Viticultural Commissioner E. C. Priber, Napa.—In answer to your inquiry of May 9th, beg to state that I have been quite anxious to ascertain the loss sustained by the recent frosts in Napa Valley, and have convinced myself that the loss is heavier than any we have had by frost within the last ten years. Most of my information, naturally, I could only get from others, as it is impossible to visit every vineyard personally. I think the statement made at the wine growers' meeting Saturday, May 7th, is very likely the result of thorough investigation. It claimed a loss of 75 per cent in the valley. Only very few of the lower vineyards are saved. The destruction is so much more universal, as no general efforts had been made to protect the vineyards against frost. I know of only one instance where it was done systematically, and that was in Mr. La Rue's vineyards at Yountville, where they burned in one night two hundred fires, and saved by doing so every vine. Usually this vineyard is very apt to be damaged by frost. In Solano County several vineyards were heavily damaged, but, as usual, the loss is very unequally divided. Mr. Briggs' vineyard, apparently all on the same level, was bitten considerably on one side of the railroad, and the other side was entirely saved. There is no question in my mind, that as a whole, the losses in my district are very heavy; but if by this short crop the market is influenced enough to raise the price of grapes to a figure which gives a living to our wine growers, the loss will be felt for only a short time.

G. Migliavacca, Napa.—I am unable to state, at the present time, the actual damage done by frost, because I have just returned from my Eastern trip, but shall in future give you a definite answer, if possible, for your valued journal.

Charles Krug, St. Helena.—I refer to my last report about the effect of the frost on the vines in the vineyards of Napa County. We all agree that over half of the crop is gone; I suppose at least 60 per cent. Near Rutherford, and farther down the valley, a great many vineyards lost over 75 per cent. Last night again (May 11th) a heavy frost hurt many of the blossoms. In former years, when grapes and wines brought good prices, we have often proved that, with heavy smoke with tar, straw, etc., damages by frost in our vineyards were a great deal lessened, and sometimes even prevented. Lately, low prices of wine persuaded us not to go to extra trouble and expense for that purpose. But energy, and faith in future improvement of our business, encouraged Mr. C. L. La Rue, of Yountville, to try to save his grapes by a practical way of smoking on a large scale, and he is now found to have won the battle. Besides smoking, there is another way to create some protection for a good many vineyards against the effects of frost by planting, on the northwest side of the vineyard, trees in one, or better, two rows, such trees whose leafage furnishes, during April, sufficient protection. The best proof of this fact can be found at Judge Stanly's vineyard, at Suscol, and also on a place in the upper part of Napa Valley. Very likely, eucalyptus is the best tree for that purpose.

Louis Zierngibl, St. Helena.—My vineyard being situated about six hundred feet above the valley, beyond the frost line, has not been damaged at all. I have examined several vineyards in the valley and found that many vines which have been frosted on their fruit-bearing shoots, and are yet in apparently green condition, will not bear any first crop this year, as the fruit on such vines will fall through during its bloom. I estimate the damage in Napa County at about 50 to 60 per cent on the first crop.

H. W. Crabb, Oakville.—In answer to your inquiry, would say that fully one half of the grape crop has been destroyed in Napa County.

J. H. Wheeler, Bello Station.—My own vineyards are on high ground, and only damaged about 25 per cent, while the crops on those areas on low land near me are totally destroyed. The frost will cost Napa and tributary valleys two thirds of its crop, and of the remaining one third the phylloxera and thrip—the ravages of which latter were unprecedented last year—will take half.

H. A. Pellet, St. Helena.—A meeting of the grape growers of Napa County was held last Saturday (the 7th). Representatives from every part of the valley were present. The extent of the damage done by the late frosts was put down at 70 to 75 per cent. The valley is swept from end to end. Conn and Chiles Valleys fared no better, as also Howell Mountain. The only vineyards that escaped are those lying on the western hills, and constitute but a fraction of the whole.

S. P. Connor, St. Helena.—The damage by frost to date is about 10 per cent in th vicinity. Would not count on more than a quarter of the usual crop, as the vineyar that are only slightly frosted will likely drop half the grapes when they bloom. I thir Santa Clara and Sonoma Counties will have the same result when blooming time com

SAN BENITO COUNTY.

William Palmtag, Hollister.—Frost did no damage worth mentioning to my vineyard one hundred and thirty-five acres, although about half of the vineyard of Mr. Bolad of about thirty acres, has been damaged. There are no other large vineyards in t county. There are now about seventy thousand gallons of wine in this county.

SAN JOAQUIN COUNTY.

George West & Son, Stockton.—The damage to vines in this county is at least one thi All the vineyards planted on low lands have been damaged to the extent of two thir to three quarters, and in some cases there will be no crop except what few bunches w appear on the shoots that will start hereafter. Vineyards on higher lands are n damaged at all, especially where the vines have been pruned long and tied up straig

CONTRA COSTA COUNTY.

B. H. Upham, Glorieta Vineyard, Martinez.—No damage whatever by frost at my pla or in the Alhambra Valley.

Frank T. Swett, Alhambra Valley, Martinez.—In the Alhambra Valley, comprising so one thousand acres of vines, there has been absolutely no damage by frost to da There are reports of damage, however, in the Ignacio Valley and Pacheco district. T season is at least two weeks backward, and there is great need of warm weather develop the vines, which, though vigorous and free from mildew or disease, are bac ward.

J. D. Buck, Mount Diablo Vineyard, Clayton.—Your circular of May 9th received, and forward answer with pleasure. The Mount Diablo Vineyard contains one hundred a thirty-five acres in vines—thirty-five acres all level, balance rolling. The thirty-five ac on the lower level are planted in Mission, Black Hamburg, Zinfandel, and Mataro, a used to bear about two hundred and ten tons of grapes. The frost has damaged t piece to fully one half, say about one hundred tons. The hill vineyard has only a f vines here and there damaged.

R. C. Terry, Clayton.—In this section the damage by the late frosts I estimate at 33 cent. Some claim 50 per cent. A short crop this year is certain, and we may get nipp some more this month.

FRESNO COUNTY.

Herman C. Eggers, Fresno.—We have had a light frost and very little damage has b done. In some places in this valley the frost has been more severe than in others, no great damage has been done. In most places where the frost appeared and nip off a few twigs and bunches, no real harm has been done, as those bunches that frost-bitten would have had to come off anyhow, or would have fallen off afterwards, the vines being so full of bunches would not have been able to have brought all of th to maturity.

LOS ANGELES COUNTY.

Sierra Madre Vintage Co., Lamanda Park.—The vines in this vicinity have not b injured by the frost, and so far the outlook is very good.

L. J. Rose & Co. (limited), *San Gabriel.*—Since our last communication to you, we h been blessed with a good rain. This, had it been unattended by quite a heavy h storm, would have been of incalculable benefit. As it was, we are, however, afraid t the vines were as much injured by the hail as they were apparently benefited by rain. There are still so many contingencies liable to arise that we cannot predict probable outcome of this year's crop. At present, we are inclined to believe that crop will fall short of that of last year.

SANTA CRUZ COUNTY.

W. H. Galbraith, Manager Santa Cruz Mountain Wine Co., Santa Cruz.—I cannot ans for the entire county. In the hill districts very little damage has resulted from fr and there is a prospect of a full crop. Of the vineyards owned by our company n have suffered to an extent worth noticing. I understand, however, that some vineya in this county—those on low ground and in sheltered localities—have been considera injured by the late frosts.

John A. Stuart, Stewart, Etha Hill Vineyard, Santa Cruz.—I said in my former report t vines in the valleys or low-lying lands were killed, meaning killed so far as a crop wo much for this season is concerned. I have nothing to subtract from that. I said, h ever, that the vines on the hillsides have been injured to the extent of having all suck and fruit branches in juxtaposition to the ground nipped more or less badly. E some fruit branches at fifteen to eighteen inches above the ground, and on wires, h been nipped. To put the damage down on hillsides in its practical form, I should that it amounts as sure now to 10 to 15 per cent at least. If the frost has gone furt

than sight sees at present, and has much weakened the vine, coulure will certainly ensue, and the loss will be heavy. I see but a disappointing fruit prospect for the fruitier, and a gloomy one for the vigneron, and every day is intensifying this. The weather has gone clean wrong.

George A. Bram, Santa Cruz.—Vines are looking well in our section (Glenwood). Frost did no damage there.

SACRAMENTO COUNTY.

Natoma Vineyard Company, Natoma.—No damage by frost that we are aware of.

Henry Mette, Folsom.—No damage done by frost. Vines all in good condition. A bright prospect for a good crop.

M. S. Nevis, Sacramento.—In reply to yours under date May 9th, will respectfully say that the apparent damage to vines in this vicinity is light. Unless we have another heavy frost the grape crop will equal last year's production.

SAN DIEGO COUNTY.

G. F. Merriam, Twin Oaks.—There has been no frost in this portion of San Diego County since the 19th ult. My report of damage by that frost did most damage on Carignans, and on very low land. Muscats did not appear to be damaged much anywhere, nor any of the vines out of the lowest valleys. This is from seeing over twenty vineyards since the frost.

MR. R. H. DELAFIELD: I would like to state for Knights Valley that there are between 350 and 400 acres of vineyard there, and I don't think there are over 60 acres in the whole place that will have any crop at all.

MR. LA RUE: I hear no report from Yolo County. I have a vineyard there also, and I am sorry we did not take some precautions against frost. One night we lost about fifteen acres, injured 50 or 60 per cent. Every vineyard around Woodland has the same difficulty. The Sacramento report was only from three points; the damage was very considerable all over the Sacramento Valley, and they will lose from 50 to 60 per cent.

MR. DELAFIELD: I can report from the upper end of Napa Valley, at Calistoga, that the damage was far greater than anything in your list. The vines that have been bitten will not have over 15 per cent. The viticulturists are tearing out their vineyards more than ever.

MR. LA RUE: I visited the Napa Valley a week ago last Sunday, and took a drive. My attention was called to the fact that where they had trees growing on the northwest side of vineyards, that immediately below those trees the vines were protected, while on the north side they were worse frosted than other portions of it. The vines in my vineyard, in Yolo, which were affected, were mostly Zinfandels. Right near them the Burgers were not so much affected.

MR. DELAFIELD: Is the question open for discussion?

THE CHAIRMAN: Yes, sir.

MR. DELAFIELD: I think that any unclean vineyard will gather frost; any vineyard with weeds will take frost quicker. Wouldn't the fact that one side of your vineyard was next to a grain field tend to gather frost?

MR. LA RUE: I have an idea that perhaps it was that, but I think it was more the location of the land. It was lower than the rest of the vineyard.

A VOICE: I understand, then, that next to the grain field it was more frosted?

MR. LA RUE: Yes, sir.

A VOICE: Well, you can't blame growers for wanting to pull up their vines, when they have to sell their grapes for $8 or $10 a ton, and at the same time they can get $12 or $14 for hay.

PROF. HUSMANN: Judge Stanly has all his vineyard, and also his

orchard, say in fifty-acre tracts, surrounded by a row, and sometimes double row of eucalypti, and he stated to a gentleman and myself th that was a complete protection to his vineyard; that his neighbors w were without that protection had their vines frosted. How they ca out this year, I cannot say. He also stated that there was no particu detriment to the trees and vines from the eucalypti, and I satisfied m self that there was very little, if any, difference in the growth of t vines or trees near the eucalypti from those farther away.

A Voice: How far were the vines from the trees?

Prof. Husmann: About twenty feet, so as to make a place for tu ing. Now, this is in contradiction to something that is generally assum that the eucalyptus is very bad, and damages every other shrub cl to it. I have convinced myself that such was not the case. Here t trees are from eleven to thirteen years old, and some of them, he t me, measured one hundred and twenty-five feet. He has cut several them, and I begin to believe that there is a good deal in the policy having eucalypti, or other fast-growing trees, for the protection of vin

Mr. Delafield: Did the vines near the trees bear as much as the vi farther away?

Prof. Husmann: He told me they bore as much. Our vineyard been frosted twice. It was frosted early in the season, and we w over it in 1887, cutting off and pruning off all the free wood, and that we secured a very fair crop—in 1887 that was—and we did same this year again, not interfering with the growing wood fr which we expected our crop, but the vines have been frosted again, how they may come out I don't know. I think this warm weather w show us. Besides, I think it is altogether too early to begin to estim the damage. Vines have great recuperative powers. We also kn that clean vineyards are better than dirty ones, but I think it too ea yet to estimate the full damage. In a week from now we will kn more what we are about than we do now. Another idea which I h not heard advanced is that when you pass a vineyard that looks cl from a distance, and apparently not much damaged, you will say: "(that vineyard wasn't hurt." But if you examine closely, and find t tops of the roots just touched by the frost, then you will know that t vineyard has been damaged, because the bloom will all drop off. I wou much rather depend on the second shoots, which come out by the side the main shoot.

Mr. T. S. Glaister: As regards the damage by frost, I think it is t soon to estimate what has really been damaged; my vineyard has been touched by frost at all; I have one hundred and fifty acres t are not touched. Yesterday I thought I would make an examinati and to my great astonishment I could see no effect from the frost. found it had not touched the flower buds. I also find that the g trees are a great protection if they are properly planted. They do protect the vineyard from wind, but are good in the case of frost. going over other vineyards than mine I am told they had frost, and t vines are damaged, and it will take at least a week before we can dec what crop we will have.

The Chairman: I wish to say, gentlemen, as there has been cons erable discussion about eucalypti, that Judge Stanly came down af the last frost two weeks ago. He asked what damage from frost h been sustained, and we all answered that we had had frost, but to wh

extent we did not know. He said he had never suffered from frost in his vineyard before. He said that when he discovered that it was getting cold he went out about 2 o'clock in the morning and commenced firing, and that after all he lost about 25 or 30 per cent.

Mr. La Rue: Upon that question of eucalypti, the question was asked if they did damage the vines. My experience has been on the other side. We have a row of trees alternating black walnut and eucalypti. The first row of vines is twenty feet from the trees, and the vines are twenty feet apart. Now, from the first three rows we don't get one third of a crop, and last year I sold my Burgers for wine. I had to guarantee 23 per cent of sugar—and I was satisfied they would make that—but by gathering those three or four rows I was docked one carload of grapes. This reduced the percentage of sugar in that lot of grapes down to 21 per cent. As to being a protection from frost, I can't say that. In the southwest corner of my vineyard I have a few that were damaged from frost right near the trees, and four or five years ago that happened. This year those near the trees were not frosted. The theory that my son advances for that is that the trees on the north side broke the frost and the wind, but I don't think that cuts any figure. I think it is the lower ground that causes the loss.

A Voice: Was there any difference in the cultivation of your vineyard, as to where it was frosted and where it was not frosted?

Mr. La Rue: No difference, except as I said awhile ago. Part of it was cultivated that day. That was the only difference.

A Voice: You have never had any experience where you have left it with a smooth surface, as distinct from where you have left it with a rough surface?

Prof. Husmann: In respect to this, I wish to say that it wasn't my experience that I gave of the eucalypti, but what I got from Judge Stanly. In a measure we already know that vines do not do well under black walnuts, and I would think that the black walnuts had more to do with it than the eucalypti.

Mr. La Rue: In answer to that I would like to say that possibly the shade has a great deal to do with it. We have not any too much moisture at any time, and the shade would affect the sugar, but you cannot convince me that the growth of the eucalypti will not.

Mr. Delafield: I agree with Mr. La Rue that the growth of the eucalypti will prevent the growth of the vines. I have had to root out several trees and throw them away. I have a row of eucalypti planted by a neighbor of mine, and I think they hurt me, and further, I don't think the damage can yet be stated, not only from the frost, but from this hot weather that has just come up. It is going to make the blossoms drop off, and the crop is going to be damaged.

The Chairman: We only judge by appearances.

Mr. E. C. Bichowsky: As far as the southern part of the State is concerned, I can say that we are with you; although we have not been affected by the frost and phylloxera, we have, nevertheless, suffered very much from a disease, the name of which to this day is not given. Some call it "Anaheim disease" and some call it by other names, but we are aware of the effects of that disease, whatever it may be. In the past year the disease has not been as bad as usual. We had a storm early in the season which injured us. We are certain that the disease is still with us. We have lost from that disease on our property about one hun-

dred and sixty-five acres. Last year several experiments were mad different parts of Southern California, of replanting vines on land wl had formerly grown vineyard and which had died. I fell in line the experiment, and set out fifty acres of Mission. They did well, are apparently as healthy as any year-old vines could be. Notw standing that I think the Missions are doing well, we see that the S less Sultana seems to be affected, and we have condemned two large in our vineyard. We also noticed that the Trousseau is more affe than ever; it has lost strength, and I have come to the conclusion the disease is not a thing that can be opposed.

MR. HAINES: I would like to inquire how this disease progresses.

THE CHAIRMAN: And is there no vine that resists it?

MR. BICHOWSKY: No; but the Burger shows very little sign, and Blaue Elba shows no sign.

THE CHAIRMAN: I want to hear about the prospect of the vintag Tehama County.

CAPT. McINTYRE: In regard to that I can only say that the frost d age has been equal to about 50 per cent of an average crop, so fa I can see, judging from a careful examination made on Sunday Monday last. I have thought that we might get away with 33 per c but I have made a very careful examination, and I think it is equ lent to 50 per cent. We have made no particular efforts to pre frost. We have done no smoking, or anything of that kind, althou am a thorough believer in that. The size of our vineyard precl anything of that kind. I don't know if I can give anything in the of particular information, because we are comparatively isolated. are out of the regular range of vineyards, and our products are confi to certain wines and brandies. I don't know that I can say anyth that will give any information about the handling of grapes and wines. As I say, no particular efforts have been made to prevent frost from injuring us.

MR. HARASZTHY: Mr. Chairman, I can add nothing to what Mr. La said, except that we have had no frost, and never have had any. have none on our place, except possibly one hundred vines, which h been affected. The only damage we had was some to orange t planted on low ground. I have been around a radius of ten or tw miles about us. First they thought it had hurt them; and on this of the Sacramento River, the west side, there are quite a number say that it will cost them about 15 per cent, but on the other sid Cache Creek they say the damage is very great. I am talking abo district now not touched by Mr. La Rue.

MR. E. W. MASLIN: I haven't been in Placer County for some ti I was around my place about two weeks ago, but we hadn't been touc by frost, except on places lying low. I have not heard any compl at all from Placer County. I think Placer County people are very si when they are hurt, and talk a great deal when there is little the trou Some time ago I made an examination into the cause of a crop dy and I found it was covered with some little white specks or insects.

MR. DELAFIELD: The subject seems to have changed and got onto subject of insects. In the northern portion of Napa Valley they h them there, and when you shake the vines myriads of fine little ins come away. What the result is, where they come from and where t

go, nobody seems to know. It is not one vineyard alone, but several of them.

THE CHAIRMAN: I suppose that is what we call the thrip; it is very bad in Napa County.

MR. HARASZTHY: The Burger has the most of them on it. It eats the leaves and exposes the fruit to the sun. There is a report made by the Viticultural Commission on this subject.

THE CHAIRMAN: The best remedy for the thrip is to destroy them during the winter season. They live under the vines, and the most favorable time to kill them is in the winter season.

PROF. HUSMANN: A good time, also, is in the fall.

MR. HARASZTHY: We turn a band of sheep every year in the vineyard, from a week to four weeks, and we find that is the most available way. Last year we put in the sheep a little late, and we have some thrip this year. In our vineyard, before we got the sheep, four years ago, we were just flooded with these things.

CAPT. MCINTYRE: In relation to this, I would say that we practiced the same plan, and found the results all that we could desire. Last fall we had about eighteen thousand sheep running over the vineyard for a short time, but not allowing them to run after the ground had been softened by the rain. We have been troubled very little, and we attribute it to that fact.

PROF. HUSMANN: In regard to this sheep business, I will also state if care is taken, and they are not allowed in too late after the ground is softened, their droppings are good manure, and instead of impoverishing they improve the ground.

MR. HAINES: I would like to call the attention of the Viticultural Convention to one or two effects of frost. Several years ago—the vineyard which I have is on high ground—but two or three years ago the frost bit the high vineyards and the low vineyards were always free.

MR. LA RUE: In hearing the reports, I see that Mr. Priber speaks in reference to the vineyards in Napa; that while the old vineyard has never suffered, the new vineyard has. We have been to considerable expense at grafting so far, and my son prepared to prevent any damage, if possible, by preparing to smoke. When the thermometer fell to 34° he started the fires, and right through the section of the vineyard where he fired very thoroughly—where he had his best fires burning—it touched 38°. He had two hundred fires, and he wrote me the next day that I hadn't lost a single vine. I went down there the following Sunday and went through it, and there wasn't a shoot in that old vineyard that was touched at all. I believe that was the effect of the smoke.

MR. C. J. WETMORE: I would like to hear from some of these gentlemen about the price of wine and grapes.

THE CHAIRMAN: That is very speculative. Mr. Haber is here, and he is on the regular list for a speech on wine storage.

MR. F. A. HABER: Gentlemen, I have been asked to speak to you upon wine storage as a relief for the past and present depression of our wine industry, and before starting on that subject I would like to call your attention to some of the causes that have led to this past and present situation.

A peculiar anomaly has been presented to me in an examination of statistics just issued by *Bonforts*, of New York, and which I think will prove interesting to those who have not seen it. It shows that since

1875, up to the vintage of 1891, there has been an actual shortag the world's wine product of 1,000,000,000 of gallons, or one thous million of gallons, the greatest deficit being in France, which produ in 1875 twenty-two hundred and thirteen and odd million gallons, or 2,213,000,000 gallons, and in 1891 875,684,000 gallons, including product of Algeria, where viticulture has only been known for the ten or fifteen years. Germany follows next; in 1875 her production 171,000,000, and which has fallen to only 13,427,091, Italy, Spain, the United States being the only wine-producing countries showin increase.

This is certainly food for reflection for you, gentlemen. Now, notw standing the enormous increase in the world's population, and h increased consumption, the problem presents itself, how can we recon this anomaly? There are two solutions to this problem: The first, which I believe plays a very small part, is the increased consumptio beer, and principally in the wine-producing countries. Up to the be ing of the present decade, beer was not drunk by the better class people in France or in Barcelona, and I have statistics to prove that consumption of beer in Paris to-day is nearly twice as much as the sumption of wine, caused by the absence of the smaller or Bourg wines, or the *petits vins*, which were within the reach of the ordi or even better classes, because wine to-day, and when I speak of I speak of any good wine, is a luxury in France, as I have statistics in possession to prove France last year imported 244,000,000 gallons than she produced, and she imported that for her own consump Another remarkable fact, which perhaps is unknown to some of yo that the city of Paris last year consumed nearly three times as m wine as the whole of the United States of America. It shows yo what straits the French people are to-day for a good natural w The same will rule in the principal city in the wine districts of Sp that is, in Barcelona; the importation of beer is something immense. wine has deteriorated to such an extent, in fact, that we know that Spanish Government has imposed a high tariff on the importatio spirits from Germany and all other places, in order to stop the wh sale adulteration.

But, gentlemen, the most important fact and the most pernic factor that we wine growers of California, and the wine producers of world, have to contend with is the manufacture of fictitious wines. tistics which I have gathered from our consular reports in 1889, show France manufactured 5,000,000 hectolitres, or nearly 130,000,000 gal of fictitious wine, made from pomace or from dried grapes, Zante rants, or any other available fruit product producing alcohol. before leaving here I had the good fortune to see a file of the "Moni Vinicole," a French paper, which places the production of fictitious w in 1891–92 at nearly 140,000,000 gallons; but that does not take consideration the gallicized adulterated wines produced in Germ and for which Hamburg is the great market.

Now, gentlemen, these adulterations in Europe and the adulterat in this country are one of the most important features and most nicious factors that we have against our wine industries, and the cure, in my opinion, is the enforcement of our legal pure wine laws, w you will find in every State in the Union, but which, like ours, is a

letter; and we must also ask for a national pure food and liquor law. [Applause.]

In France and Germany it is a felony to sell an adulterated wine unless labeled such. In 1879 (I quote from a gentleman from Hamburg, Germany) the increase in the production of fictitious wines grew to such an enormous extent that the German Parliament was petitioned by the wine growers asking for its abrogation. This same gentleman, who was here the other day, had an establishment at a place called Kippenheim, which occupied an enormous area. They built an immense cellar, and had an immense establishment for their business, which amounted into millions of cases, and made wines from dried grapes and everything that would make alcohol. In 1879 the German Parliament passed a law compelling these people to put a label on this product—artzwein, or artificial wine—in sufficiently large letters and such prominence to draw the attention of even the uneducated to this label. The consequence is that to-day this establishment in Kippenheim can be bought for one cent on the dollar, because it did not pay these gentlemen to move, and their vocation, like Othello's, was gone. I have that on the word of a gentleman in the city to-day. This will show you to what an extent this adulteration has gone, and to what an extent the governments of those countries have protected the consumers' pockets and their health. Unfortunately, in this country their is no protection for the honest wine dealer, and good California wines are generally sold, and I may say mostly sold, under fictitious foreign labels, because we Americans are such snobs that we don't think anything fit to eat, drink, or wear that doesn t bear the impress of a foreign label. [Applause.] And when we succeed in educating the American to drink American wine under an American label, I think, gentlemen, that one great victory against this adulteration will be achieved. We have got to educate our own people to appreciate our own wines, and not allow the story to go out broadcast that we cannot make good wines, and at the same time walk down Broadway or Sixth Avenue, New York, or State Street, Chicago, and see our wines sold under foreign labels and drank as such. We have got to have our California wines sold under their own name, and with the name of the country of their production.

As for the future of our wine industry there is some hope, when we take into consideration the tremendous deficit in the production of natural wines and the substitution of light fermented wines against whisky and spirits. When we can make that substitution we are going to settle a very important question in this country, and I am glad to say, gentlemen, that the whole country is taking up this question and pondering on this subject. I would like all of you gentlemen to buy a copy of Frank Leslie's of the last issue; they have devoted about six to twelve columns on the substitution of light wines in the place of "horizontal," or whisky drinking.

Now, as I said, when we take into consideration this immense deficit in the world's production, and when we look over our broad land here, where every foot of ground is susceptible of viticulture, what promise does it give us for the future? I know that these ideas are roseate, but, gentlemen, I do believe that if we can hold out, if we can preserve our vineyards, if we can avoid this clash between the producer and the wine merchant, if we can have more cohesion, more coöperation, so that we can come together and advertise our resources in this country in a

viticultural sense, we are going to attract the wine growers of the wh country to this favored ground. They are coming now from Fra and Germany to replenish their cellars, and it only depends on y gentlemen, to find out what these people want.

I can tell you that I was a party to a contract for 300,000 gallon red wine for export to Cette, France; it was shipped and gave satis tion, and an order for 600,000 gallons more followed; but, unfortunat the McKinley bill caused a retaliation on the part of France, and I sorry to say that to-day the French Government has refused to p American wines on the same basis of tariff as the most favored nati I am afraid that unless something is done towards reciprocity w France that that trade is shut off from us, at least for the present.

I was visited a few days ago—only yesterday, in fact—by a gentler who was the distiller of Martell & Co. for ten years, and he says he brought his still with him, and proposes to make cognac in this coun "because in France," he said, "we have no means of producing it, as have not the grapes. I want, first, some encouragement from some la concern to show that we can produce cognac."

However, I don't think that in the history of the viticultural inte that the market has been so depressed as it is to-day, and furtherm in view of the short crop, the market has shown no improvement, it may come a little later.

Now, gentlemen, I ask your kind indulgence for this little digress that I have made, which leads up to the subject that I wish to spea you about.

It is a well-known fact, and a very sorrowful fact, that the majo of the viticulturists of California are lacking the means to find a ma for their products. There is, I believe, a remedy for it, and that is institution of a warehouse and collateral bank system, such as h been conducted in France for the last two hundred years, and wh have been both financially and commercially immensely success We will take, for instance, the establishment known as La Villet, wh is not far from Paris. It is a stock company with a certain amoun capital, and which provides storage, and which is conducted in the lowing manner: This company, at the beginning of the vintage, se out announcements that they have room for so much wine; the ap cant who wants and applies for storage, states how old his wine is, how much he has. The warehouse concern sends their expert to exam this wine; it is tested for its strength, for its keeping qualities, and w accepted the cooperage is sent for it, it is brought into the wareho and it is given a place. If it is red wine, it is given a temperature red wine; if it is white wine, it is different—every wine where it belo

Now, as I said, attached to this warehouse is a collateral bank; bank loans this man a certain amount per cent upon his wine, charg him a nominal rate of interest. They keep that wine there as lon that man wants it kept; he has to pay for the racking, and he ha pay so much rent per month for the storing of the wine, and that w when it is received in this warehouse, gets it birthmark; it is whisky when it goes into a bonded warehouse, and like brandy or a thing going into the London docks. Then you see that the secu which the bank has is constantly increasing in value to the ba because that security is being taken care of by practical and exp enced wine tenders, and that is the reason to-day, gentlemen, why

so difficult for any of us to borrow money from our banks, as they will say, "It is perishable," and to lend money on wine in your own warehouse is simply illegal.

Now, another duty of this warehouse system and collateral bank, is that it will act to control the price of wines in the market where they are produced.

Let us take for illustration, suppose we should be able to inaugurate the same system here. We have in California, I believe, nearly seven thousand grape growers; then we have nearly three or four thousand who devote their grapes to wine growing, and out of those four thousand we have, I believe, seven hundred wine makers. Now, suppose we can institute the system alluded to on the coöperative plan, and that is the only way it can be done; suppose every man interested in grapes should take $100 worth of stock, you would have right off $700,000 to commence with. With $700,000 you will have sufficient money to buy at least a million to a million and a half of cooperage, and still have a reserve fund of nearly half a million dollars to start your collateral bank. That is the result if you start under the coöperative system. With one million, or two or three million gallons of wine, you will be able to make market here, and also make the price here. Before the beginning of every vintage, or say every year, as they do in France and Germany, let notices be sent throughout the world that there will be an auction of two or three million gallons of wine; it will draw to your city every man who buys ten or twenty or fifty thousand gallons of wine, and San Francisco will make the price for it.

Now, gentlemen, the only way that this movement can be thoroughly and successfully inaugurated is upon the coöperative plan, and I am satisfied that when it has been thoroughly and fully discussed you will find that it is possible. It will be not only a relief to your market, it will be not only a relief to the grape growers, but it will have the effect of systematizing the business and placing it in a normal condition, and attract not only the wine buyers, but also those who are interested in viticulture from all parts of the world. I am very much obliged to you for your attention. [Applause.]

Mr. P. C. Rossi: I have got a resolution that I want to introduce to this convention.

[This resolution censured certain dealers not named for engaging in cutting prices to ruinous rates in the New Orleans market.]

Mr. Haines: It seems to me that that resolution is a little bit out of order, because I haven't heard of any effort to lower the price of wines.

Mr. Rossi: Yesterday morning I was conversing with several gentlemen, wine producers, and they said: "Here we meet and talk about growing, etc., but where we are most interested nothing is said. We are on the verge of starvation, and if we don't say something now when we are in the convention when shall we say it?" Every one knows the condition of the market; the crop was short last year, and it is short again this year—shorter than ever before. The prospect this year is certainly not very good, and that is the reason (when I heard this gentleman from Santa Clara County ask what would be the effect of this on the shrinkage of market values) I thought it was best at this time to introduce this resolution. Everybody knows that the price of wine has been so low that nobody can make a living. Now, if the wine makers all through

the State would combine like the Napa Valley wine makers hav think it would be a good idea.

The Chairman: Mr. Bundschu, can you give us any ideas upon wine market?

Mr. Bundschu: Mr. Chairman, it would be rather delicate for w merchants to talk about that. We all know that attempts have b made to depress the market. I don't know what the motives have be and it should not have been done. I can't identify myself with th attempts, and I am very sorry for the present condition of the mar and that the leading merchants should have seen fit to reduce the p of wine. I can't see any reason for it.

Mr. Haines: I think the object of this convention has been acc plished. It has shown that the present crop is inclined to be sh We are not intending to sell our wines at the present prices, in vie the shortage. If on the other hand we had in view a large crop, t we would be more inclined to sell. The effect I think would to make the growers hold on in Napa County, and I presume Santa Clara County; it will have a tendency to make people reluct to sell. It will also have a tendency to make the merchants give better prices. I would have no objection to the resolution, only it little bit condemnatory. We have carried one resolution, and I th we should do it in this case. As has been said we can come toget and come to some agreement, but I don't think it can be done by s ing hard words against each other. I think if the wine merchant California understand that we can send our wines to other mar they will give us higher prices.

The Chairman: Mr. Haraszthy, can't you give us a little informat on this subject? You are a wine merchant and a producer also.

Mr. Haraszthy: All I can do, Mr. Chairman, is talk, and I can't that as well as a great many of the others, but I might give you on two ideas.

This situation of the wine market for the last four years makes think of a very good book that was put in my hands for certain p poses, and which I was made to read often and study often—the Bi You remember the part where, in making their explanations, one poi to the other. Now, the wine grower is pointing to the wine merch and the wine merchant is pointing at the fellow in the East, and fellow in the East is pointing back at the wine grower; so it goes continually, but the whole trouble—I am going to give you a new ide the whole trouble is with the real estate man who induced us to b and made us believe that for an investment of $125 we were going realize a $400 increase. The whole trouble lies in the real estate m A few years ago everybody rushed into the business; everybody plan vineyards, but nobody thought of the production of brandy. That wo have been successful, and that has been the only thing that we h been able to make any money at for the last five years. This wh trouble lies in the fact that we have made too much wine, as we h taken out of the ground too much silver.

Now, how can you get rid of it? I have been trying to solve t question, and have been working among the flock for a great many ye I have been with you heart and hand; I am suffering with you; I suffering now. I feel that I have a vineyard that bears about two t and a half per acre in the most favorable years, and a ton and a hal

the other years, and I find that if I don't sell most of my wine to the consumers I won't be able to sell it at all, and that if I have to come to San Francisco and sell to the wine merchant, to the shippers, I would be far worse off than I am now. The fact of it is, there ought to be some means of getting rid of this surplus. There was a means offered about three years ago, when it was suggested that the holders of wine combine and distill about two or three million gallons. For the time being that took some shape. Eventually the capitalists brought together found, on consultation with the wine growers, that they were not willing to put in anything, or bind themselves for two or three years, and give all their grapes to this distilling combine. The capitalists said: "You want us to put in the money and you derive the benefits." If it had been possible to carry out this idea something might have been done; but it wasn't. Each of us to-day has some different idea, and we will all go away and leave the work undone. As for coöperation, there is no such thing in small communities. You must take in all the wine growers in California. One thing is certain, you have got to get some means of getting rid of this surplus. We are beginning to get a little market in England and a little market in Germany for our brandies, but that is not sufficient. Why, we have been making 25,000,000 gallons a year in recent years. We will not do so this year. These wines come pouring in from three or four crops back, and generally they are very poor wines, too.

That is the state of affairs. You must get rid of your surplus, but you will not do it by saying you are going to put up a scheme to cinch the trade. I am not taking the part of the trade; they are perfectly able to take care of themselves, and the trade are fighting much more than you think they are. The only way I can see out of this thing is for the distillers to act. For the last year there has been firmness (I don't say an increase) in the price of brandies. There has been a firm demand, and there has been more wine distilled than ever before, but still the demand is active. Make your bad wine into fair brandy, or, at least, as good as you can make it; everybody will do better and nobody will sell, thus relieving the wine merchant as well as yourselves. What the merchant fears now, and he has his complaint as well as you have, is the result of your demands. You go around to the different firms and try to sell your wine and don't do it, and you go back home and remember some Tom, Dick, or Harry in Illinois, or somewhere else, and you make a consignment to him. At the end of six or seven months he calls for $100 more, to pay freight or something, and the worst of that is that when that wine is sold at a sacrifice it has made a price for the wine merchants of California; it has made a price for the wine in that section. I sell, for instance, port wine for $1 a gallon—I don't do it, but I would like to. Mr. Jones, or some fellow down here, sends to New York, to some commission merchant, a consignment of port. He sells the port, after some months, at 75 cents—a drop of 25 per cent—and that makes the market price of every other port that is offered there, and the merchant has got to go in and do the same thing.

While we have a plethora of wines here, while our tanks are bursting and our cellars threatening to break down, there is a market that, if we could reach it, would take all we could send them. They are now drinking adulterated stuff, and they are paying high prices for it. I refer to the countries of South America; but the trouble is in the transportation.

Three years ago one of the largest houses in Buenos Ayres, whic said to sell 100,000 gallons a month of Italian wine, asked us to s them a shipment of wine. In looking around, what did I see? I fo that to get the wine there we had to ship across the continent and 10 cents freight, then 2½ cents across the Atlantic to Hamburg, and f Hamburg 2 cents to Buenos Ayres. That one firm could use 100 gallons a month, but we have no communication with Buenos Ay It is the same way with Havana and other places. If we could tr port our vineyards to the other side of the Atlantic we would no here talking about prices.

A great trouble, as far as I have gathered, is that when there short crop we go down to the wine merchant, as we have done this t with a cry of a "short crop," and in the East they don't believe all. They believe it is a California lie. The wine merchant is in position of a capitalist—he cannot meet you on this question. hears of somebody who has been pressed by his necessities, and sold such and such wine at such and such a figure, and so he sits b and waits until a man comes who is forced to sell. How can he otherwise? His law is the law of self-preservation, and I think the a misunderstanding between the wine grower and the wine merch that should not exist, in the interests of both of them. If it is a that this year's crop will turn out as it is said, I think the questio settled. We are actually increasing our exports, we are making r brandy, we are making more raisins, we are sending more green fru the East. Raisin making is being overdone, of course, but still it take that part out of the market, and possibly from that there will better state of facts.

A VOICE: What about Guatemala, Costa Rica, etc.?

MR. HARASZTHY: I will answer that question by saying this: there is a very good trade opening up there, and it is being pushe all it is worth. But I want to say that if the wine merchants w come together, and make a holy oath that they wouldn't let a drum go out, but that they would sell from their offices, it would be be The actual price of wine is made by drummers more than any one They are in good financial condition there, and also in the Argen in spite of the Baring Brothers' failure; and every San Francisco h is represented now in Central America. At Havana a market has been established, but the long credits are a very great detriment in Mexico and in Central America.

MR. LA RUE: You can reach the Argentine by shipping full car of wine.

MR. HARASZTHY: Oh, yes; but what ship would take a full carg wine? My attention has been drawn to that. There may be a ch of inducing this new steamship company to stop at Buenos Ayres take in hides, tallow, etc., coming up, and take back wines. And could do so without very much delay.

A VOICE: There is one problem that strikes the grower alway peculiar, and that is that he comes to San Francisco and sells his for 10 cents a gallon, and afterward when he buys it, he has to pay bits a bottle for it, and there is an immense difference between the

MR. HARASZTHY: I will answer that. I have bought wine wi the last six months for which I paid—it was the last vintage—for w I paid $1 25. The wine that you bottle, if it has the name of

prominent house, is the best that you have of that particular quality, whether it is Zinfandel or anything else. These wines have to be three or four years old, and the man that bottles wine is taking enormous risks. I can tell you of firms that are selling on six months' time, any quantity that you want, for $1 90 a dozen bottles. The cost for the beautiful caps alone is $5 a thousand.

A VOICE: I never struck it.

MR. HARASZTHY: Very well; you come down to my store, and I will show you.

A VOICE: I have been in New York, and seen California wine, beautifully capped and cased, at $2 10 a case.

MR. HARASZTHY: The trouble generally is this: that your interests have compelled you to dispose of your cellars just as they are. In them you will find quite an amount of poor wine, and you will find some lots of very excellent wine. They are all unclassified, and they are all sold entirely too cheap; and I assure you that if you went down to the bottom of the wine merchants' affairs you would find that these wines don't bring any more on 'Change than the others. But he is selling so low at present that he cannot afford to sell his best wines. Every wine merchant here has some wine that he don't care about selling. He knows that he will get his price some time; but that is rather expensive, and I assure you that wine is being sold in the East for $2 50 to $3 a case. Now these Zinfandels, say, must be from two to three years old; they must be racked off, and if you pay rent, insurance, and other expenses, you can't keep them for less than 7 cents a gallon every year. You can figure it down to 4 cents, but in that case a man must own the property and charge nothing on rent account. I know a number of restaurants and establishments here that are paying 6 cents for pints, bottles returned, and 12 to 13 cents for quarts. [Applause.]

CAPTAIN McINTYRE: I desire to express my concurrence with the last speaker relative to the distillation of our surplus wine, and I desire principally to say that care should be used in this direction. Don't let the wines spoil; don't wait until they are old and spoiled, because the quality of our brandy will be deteriorated, and we will suffer in consequence. Every man engaged in making wine knows what will be good, and what will be bad, and what will be medium. There is no doubt in his mind; but he says, "I will wait and see if anybody comes along who will take it all." That is not the way to do it. When you have wine that is not good for the market, distill it.

We can make good brandy in California. Another point, don't try to make brandy at the lowest possible figure. Whatever you do, go slow. If your distiller says that it will cost you 5 cents a gallon, don't hurry him; make the brandy right; don't attempt to rush it along so as to make it at the lowest possible price. Don't engage a man at $1 a day to keep up your fires and trust that everything will come out all right. That is not the way; go slow; whatever you do, distill the wine before it is spoiled and you will get a good, sound brandy, and get a good, sound price for it.

THE CHAIRMAN: There is a resolution before the house; we want to dispose of that before we adjourn. I want to say, also, that I concur with Mr. Haraszthy. We are all too willing to place our sins on the shoulders of others. We have done this thing voluntarily. We have planted the vineyards, we have built our cellars, and if we have done

it in excess we have only done what other people have done. Now, Viticultural Commissioner for the Sonoma District, I have been charg repeatedly and repeatedly with being to blame for this state of affai I say that we have not, since the Commission was in existence, advi anybody to plant a vine. And now I say, gentlemen, look at home a see if you are not to blame yourselves. You have planted more vi than you can take care of, and when we ask you to form a distilli company we can't get the capital. I tried here, Capt. McIntyre worl hard, and now what is the use of kicking. We are in a fair way to a good price for our grapes, I think, from the reports. We see dawning, and I say hold on; hold your breath and sweep around y own doors, and see that your own doors are clean.

MR. ROSSI: I will withdraw my motion.

THE CHAIRMAN: One more thing, gentlemen. I want to announce committee that is going to visit the World's Fair Commission. I put upon that committee Mr. La Rue, Mr. McIntyre, and Judge Sta Of course, I have been added on there by the convention.

MR. BUNDSCHU: I move that a vote of thanks be tendered to DeTurk as our Chairman, and to Mr. Scott, the Secretary, for t kindness during this meeting.

[The motion being duly seconded, was upon vote declared d carried.]

MR. LA RUE: I suppose that we can't see the World's Fair Comm sion until next month. The Commission will not be in session u the second Tuesday of the month.

THE CHAIRMAN: I suggest that we do our business through the Se tary, Mr. Scott. He will attend to it for us.

The convention then adjourned *sine die.*

APPENDIX C.

THE UTILIZATION OF WINE RESIDUES.

BY ANTONIO DAL PIAZ.

[Translated from the German specially for the Board of State Viticultural Commissioners.]

CONTENTS.

THE UTILIZATION OF WINE RESIDUES.

INTRODUCTION.

Wherever grape growing has had any considerable extension it forms one of the most important branches of agriculture. Although in most grape-growing countries great attention is paid to the cultivation of the soil and the making of wine, too little attention is, as a rule, given to the utilization of waste products, which, with proper care, can be turned to vast practical advantage. The waste products that permit of the most ready treatment are:

First—The pomace.

Second—The lees.

Third—The tartar which separates from the wine and deposits itself in crusts on the inside of the casks or barrels.

In the principal wine-producing countries of the world these products represent an aggregate value of several millions, but as a rule little use is made of any of these except in the manufacture of cream of tartar. In France, more than in any other country, all of these products are extensively worked, large factories being established for the purpose. Raw tartar is exported from most of the other great wine-producing countries.

The value of these bye-products, and the various methods of working them to practical advantage, have been known for some time. For instance, in the works of the well-known physicist and chemist, Dr. T. R. Glauber, dated 1658, will be found the method of pressing wine from the lees and of producing brandy and tartar from lees and pomace.

But in most of the leading wine-producing countries only a little use is made of the pomace and lees. One of the oldest methods of utilizing the pomace is in making "press wine," which is accomplished by adding water to the pomace, and letting it ferment. Even the old Roman authors speak of the preparation of "press wine" from the pomace, which they called *lara*, and gave to their slaves.

In some places brandy, or a grape spirit, is made from the pomace; in others it is fed to cattle, or used as fuel. In some countries oil is expressed from the grape stones.

But, as a rule, these waste products of the winery and wine cellar are not put to their highest use. The principal point is to extract every valuable ingredient, and not lose one. This can be accomplished in different ways, but also as to give everybody, even the smallest producers, a chance to work up all the residues, and not waste anything. The proper use of these products is, therefore, of great importance to all producers.

CHAPTER I.

PROPER MANNER TO USE POMACE—CHEMICAL COMPOSITION OF POMACE

Pomace is what remains in the press after pressing is over. It w contain, in spite of the most careful pressing, and with the use of t most powerful hydraulic pressure, a very considerable portion of t juice of the grape, or must, or fermented must, as the case may and other substances, such as sugar, etc. The quantity of juice rema ing in pomace varies according to the pressure applied and to the su content of the grapes originally. Therefore, in good wine years, wh the sugar content runs high, the pomace will be found to be more va able than in the poorer years. Although in one hundred parts of p fectly ripe grapes there may be even 95 per cent of juice, yet it mi be said that on the average far less can ever be expressed. Moreov the juice remaining in the pomace is not the only ingredient. Th also remains the skins, consisting largely of cellulose, the common ve table ingredient, and also tannin; and in the skins of blue grapes v be found a peculiar blue coloring called œnocyanin, which gets its color through mixing with acids, and is soluble in diluted spirit of w and a little tartaric acid. This is the coloring matter of red wines. the pomace will also be found the grape stones, which have often b analyzed, and which contain from 6 to 7 per cent of tannin; from 1(20 per cent of oil, depending more or less on the climate; and also so vegetable albumen and cellulose. The grape stems remaining in pomace also contain considerable tannin (in dried stems from 6.5 to per cent), and also malic and tartaric acids.

The skins may be said to contain vegetable albumen, cellulose, a pectose in the following proportions:

Cellulose / Pectose	86 per c
Vegetable albumen	14 per c
Total	100 per c

The relative proportion of stones, skins, and stems in the pom varies with different grapes, their degree of ripeness, and other matt The ingredients of the ashes of pomace, after burning, are also importance. These are principally carbonic acid, sulphate of pota sulphate of soda, chloride of potash, chloride of sodium, phosphate lime, carbonate of lime, clay, compounds of magnesium, oxide of ir etc. Dried pomace gives, according to the kind and ripeness of grapes, from 2.5 to 6 per cent of ash. Of the ingredients of the a the potash and phosphoric acid are the most important and valua The proportion of the ingredients varies not only with the variety grapes, but also with the proportion of stones, skins, and stems in pomace. This can be seen by the following:

	Pomace.				Skins.		Stones.			Stems.	
	Dried.	Riesling.	Fresh Gutedel.	Fresh Red Burgundy.	Kleinburgunder.	Schönfellner.	Dried Kleinburgunder.	Dried Schönfellner.	Dried Red Burgundy.	Fresh Gutedel.	Fresh Red Burgundy.
Ash (total)	6.65	3.04	0.50	0.458	3.745	4.321	2.776	2.837	2.00	1.429	1.667
Potash	36.9	37.00	Chloride of sodium and chloride of potash, 54.55.	Chloride of sodium and chloride of potash, 54.55.	32.751	36.942	23.658	23.784		Chloride of sodium and chloride of lime, 33.33.	Chloride of sodium and chloride of lime, 33.33.
Soda	0.4	1.17			1.668	1.275					
Lime	10.7	26.93			15.970	17.121	27.319	28.720			
Magnesia	2.2	5.48			4.723	3.506	7.239	6.937			
Oxide of iron	3.4	0.95			1.657	1.553	0.387	0.523			
Manganese					0.596	0.403	0.296	0.365			
Siliceous acid	15.3	0.87			2.724	2.026	0.809	1.028			
Sulphuric acid	5.4	3.14			2.736	3.059	2.036	2.106			
Phosphoric acid	10.7	21.05			15.396	12.342	22.926	17.001			
Carbonic acid	12.4				9.584	14.035	13.179	16.262			
Chlorine	0.4				0.390	0.562	0.228	0.287			
Sodium chloride		2.05									
Phosphate of lime			27.27	27.27					50.00	23.33	23.33
Sulphate of lime											
Sulphate of potash									3.50		
Chloride of lime									1.50		
Alkaline carbonate									13.50		
Carbonate of lime			10.91	18.18					17.50	43.33	43.33
Carbonate of magnesia			7.27	18.18					14.00		43.33
Carbon and sand					12.348	5.491	0.762	1.028			
Name of analyst	Boussingault.	Albert.	Berthier.	Berthier.	Crasso.	Crasso.	Crasso.	Crasso.	Berthier.	Berthier.	Berthier.

ANALYSES OF ASHES OF POMACE, SKINS, STONES, AND STEMS.

Mineral Constituents of Ash.	Pomace.			Skins.		Stones.	
	After Boussingault.	After Albert.	After Berthier.	After Crasso.	After Crasso.	After Crasso.	After Crasso.
Potash	52.64	37.00	*59.69	41.656	46.887	27.868	29.454
Soda	0.58	1.99		2.130	1.618	-------	-------
Lime	15.26	26.93	22.86	20.315	21.731	32.169	35.567
Magnesia	3.13	5.48	3.78	6.019	5.451	8.527	8.559
Iron oxide	4.58	0.59	-------	2.107	1.971	0.445	0.647
Manganese oxide	-------	-------	-------	0.758	0.511	0.348	0.452
Siliceous acid	-------	0.78	-------	3.464	2.571	0.952	1.273
Sulphuric acid	7.70	3.14	-------	2.480	3.828	2.398	2.608
Phosphoric acid	15.26	21.05	13.67	19.575	15.665	27.005	21.054
Hydrochloric acid	0.59	1.26	-------	0.509	0.733	0.275	0.344

*Chloride of sodium and potash.

This shows that the potash, phosphoric acid, and lime are the m important mineral constituents of the ash.

CHAPTER II.

WORKING POMACE.

As a rule, only a small portion of the valuable constituents of pom are turned to practical use. The greater part of the attention pai the pomace is the extraction of the spirit which still remains in pomace after fermenting, by making the so-called pomace brandy. a rule, the oil is not extracted from the stones, but this practice lately been introduced in Italy, and thence into France, Switzerl and some parts of Germany. Elsewhere different uses are mad pomace. Thus, in France, particularly near Montpellier and in lo Styria, it is used in the manufacture of verdigris. In other plac enters into the manufacture of potash.

Again, in some places, pomace is used for fodder and manure, usually it is thrown away altogether. If the pomace is utilized to fullest extent it will be found that the bye-products thus obtained defray, in a large measure, the expenses of the winery, and allow profits on the wine, brandy, and vinegar to be almost wholly net. L establishments will be found particularly advantageous in working the pomace. The operating expenses can thus be considerably redu

The manner of procedure to realize fully the products of the pom is as follows:

First—The tartaric acid, which is in combination with lime potash, is extracted from the fresh unfermented pomace if the mu removed from the pomace before fermentation.

Second—If the pomace is not fermented, it is set in fermentat From the fermented pomace the brandy is distilled. Distilled dried pomace can be used in this process for fuel, reducing the cost, the ashes make a most excellent fertilizer for the vineyard.

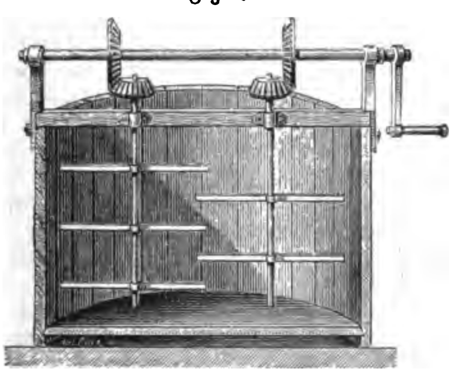
Third—If it is desired to extract the oil from the grape stones, t

be sifted out. After the oil is extracted the stones can be used as urce of tannin.

PRODUCTION OF TARTARIC ACID.

produce tartaric acid or tartrates from pomace, the fresh pomace is, rding to the French system of Von Juette and de Ponteves, taken the press and placed in large tubs which are lined with lead. er enough is added to cover the pomace, and a little over. Add 2 kilogrammes (4.4 pounds) of concentrated sulphuric acid to y hectolitre (26.4 gallons) of water. Now let hot steam pass ugh a pipe into the pomace, and let it slowly cook for three or four s. In the reaction which follows, the lime takes up the sulphuric and the tartaric acid is set free. Boiling the pomace in the sul- ic acid does not affect its value for later operations, and, as a matter ct, some of the cellulose is converted into grape sugar, increasing, if hing, the quantity of grape spirit which may be obtained later. liquor in the tubs which contains most of the free tartaric acid is ned from the pomace and the pomace itself is thoroughly pressed. liquor then goes into other tubs lined with sheet-lead. A stirring e is placed within and has to be covered with lead.

Fig. 1



g. 1 shows a tub with such an attachment, which is worked by , and which can be detached at any time. In large establishments is worked by steam power. After the liquor has been poured into ub, lime water is added as long as the liquid shows an acid reaction, while agitating by means of the stirrers. Blue litmus paper is the means of testing the state of the liquid. When lime water is added artrate of lime is formed, and as soon as the stirring is done it set- to the bottom of the tub. This has afterwards to be thoroughly ised with clear water. The lime tartrate can then be sold as such orked over again. Should sulphate of magnesia be present in any tity, it may prevent the lime salt from precipitating thoroughly. is case you will have to pour from four to five parts of water on the ace and add enough soda to allow the liquid to react neutrally, after ng been boiled three hours. This turns the tartrate of lime into onate of lime, which separates from the liquid; and the tartaric of sodium and potassium remain behind. The tartrate of lime

can subsequently be obtained by dissolving one part of chlori calcium in three parts of water, and adding this to the neutral li

On the average the pomace remaining from grapes which will duce 10,000 hectolitres of wine will produce 20,000 kilogrammes (4 pounds) of tartaric acid so treated. (About twenty pounds to th of grapes.)

After having extracted the tartaric acid from pomace, the remai liquor is again poured on the new pomace. It is best to heat a before doing so, so as to permit of rapid fermentation, in case the mentation has not already occurred. The best temperature is from to 25° C. (67° to 77° F.). Closed fermenting vats, such as shoul used in the manufacture of red wine, should be used here, to pre the further fermentation into vinegar. At a temperature of 25° C. F.) the fermentation will be completed, so that all the possible s will be formed in the wine pomace.

MAKING SPIRIT FROM THE POMACE AND ŒNANTHIC ETHER, AFTER HA GONE THROUGH THE ABOVE PROCESS.

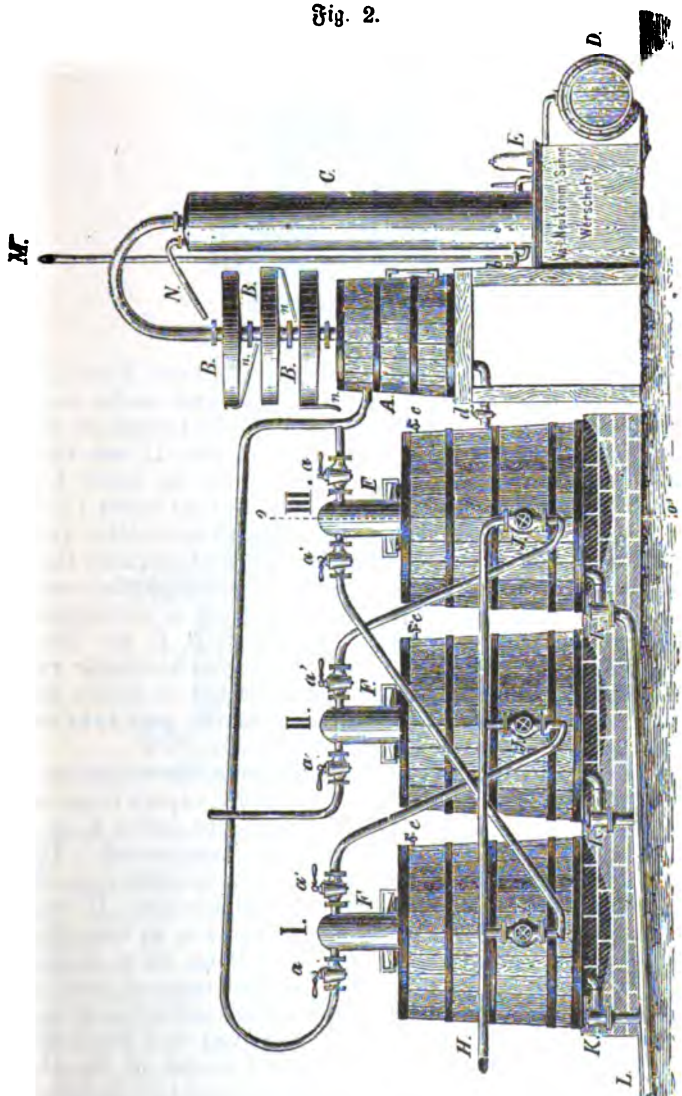
As stated above, the yield of brandy from pomace will be incre whenever the above process is employed, because the addition of phuric acid will increase the percentage of sugar. The amount of alc remaining in the pomace, of course, varies very much. It depends only on the amount of sugar originally contained in the grapes, but on how much they have been pressed and how the pomace has been served. As the internal revenue tax on the manufacture of bran very high, and as pomace sometimes contains very little alcohol, expenses of distillation must be made as small as possible, to in any profit from operations, and the processes must be made as si as practicable; most of the stills used up to the present time do answer the requirements of cheapness and simplicity. In their arra ment and operation most of them will be found more or less anno and wasteful as regards time.

Direct heating in all pomace stills is to be avoided, as liable to the pomace; much water has to be added in these cases, and this d heating and necessitates a large consumption of fuel. Moreover, the mash is heated in this manner, the pomace must be constantly st so as to prevent burning at the bottom of the still. All this can, ever, be done away with by using steam for distilling.

To manufacture brandy from pomace on a large scale and profitab distilling apparatus must be provided which permits of quick filling emptying of the pomace, and at the same time will permit of the con use of the steam and water at the command of the distiller. Whe steam is used, the copper boilers can be dispensed with and oa other casks can be substituted instead. Already several well-constru stills for handling pomace and lees have been devised, and now those that can be recommended will be mentioned.

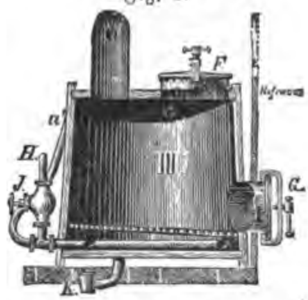
Figs. 2 and 3 show the construction of a still suitable for han pomace. It is worked by steam, and is so arranged as to allow a tinuous action. Two of the three boilers in Fig. 2 are constantly at while the third is being emptied and filled. The apparatus (Fi consists of three boilers I, II, and III, each one holding about 560 li *A* is the tank for the once distilled spirit; *B*, *B*, *B* are the becken

Fig. 2.



e cooler; *E* is the alcoholometer, which indicates the proof of the llate; *D* is the receiver of the distillate; *F*, *F*, *F* are the filling doors e boilers; *H* is the steam pipe; *J*, *J*, *J* are valves for turning off the n; *K*, *K*, *K* are the discharge pipes; *L* the conduit pipe which lets he dregs; *c*, *c*, *c* are testing cocks; *d* is the pipe for letting out the distilled spirit; *M* is the pipe for supplying the cooler with cold r. The cocks *a á*, *a á*, *a á* are for enabling any one of the boilers e cut off from the others. *N* supplies the cold water to the becken.

Fig. 3.



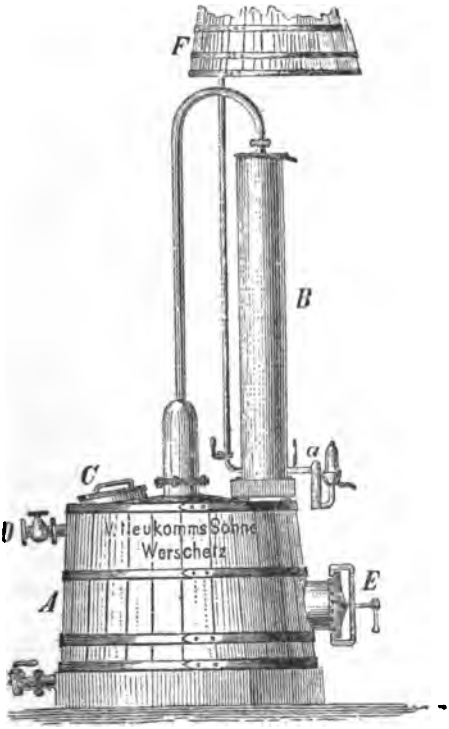
The manipulation of this apparatus is as follows: First all the t boilers are filled with pomace, and all pipes and cocks are close well as the doors *F*, *F*, *F*. Steam is then slowly turned on througl pipe *H*. The valves *a* of boiler I and *a'* of boiler II are then ope and then the valve *J* of boiler I. The pomace in boiler I is the boiled by this operation, and the vapors pass into boiler II, where they are partially condensed. The higher alcoholic vapors through the cock *a* of boiler II into the pipe above, and thence t tank *A* for once distilled spirit. Here another partial condensa takes place, the lower degree spirit running back to the boilers, and higher alcoholic vapors passing to the beckens *B*, *B*, *B*. Here aga partial condensation ensues, and still the higher alcoholic vapors into the cooler *C*, where the water is eliminated as much as poss and all vapors condensed, and the brandy finally goes into the rec *D*, passing the alcoholometer at *E*.

As soon as the still has been run for an hour, the contents of boi may be tested through cock *c*. If no alcoholic vapors come out (w can easily be told by the smell), the valve *J*, of boiler I, is shut, the cock *á*, of boiler II, and *a*, of boiler III, are opened. The coc and *á*, of boiler I, are closed. Boiler I is now entirely cut off from others, and can be emptied and refilled, while boilers II and III work the same as I and II did before. An hour or so later the cont of II can be tested through the cock *c*, and if no more alcohol is tained in the boiler, it is cut off in a similar manner, and boilers and I are operated together, while II is being emptied and refilled. this manner the pomace is thoroughly worked and the hottest st thrown into pomace already partially exhausted of its alcohol. usually takes from three quarters to one and one half hours to dep each cask of all its alcohol after the steam is turned directly in.

Of course, a large pomace still like this is feasible only where l quantities of pomace are obtainable.

Whenever only a small quantity of pomace is to be distilled, the shown in Fig. 4 will be found sufficient for all purposes. This can be worked by steam, has a wooden boiler, and is very much like one described before. *A* is the wooden boiler; *B* is the cooler; *C* is opening for charging the still; the steam is admitted at *D*; *E* is manhole for discharging; *F* is a reservoir for water with which to coo At *a* there is an arrangement for catching the œnanthic ether. boiler can be made any desirable size. In this apparatus it holds

Fig 4.

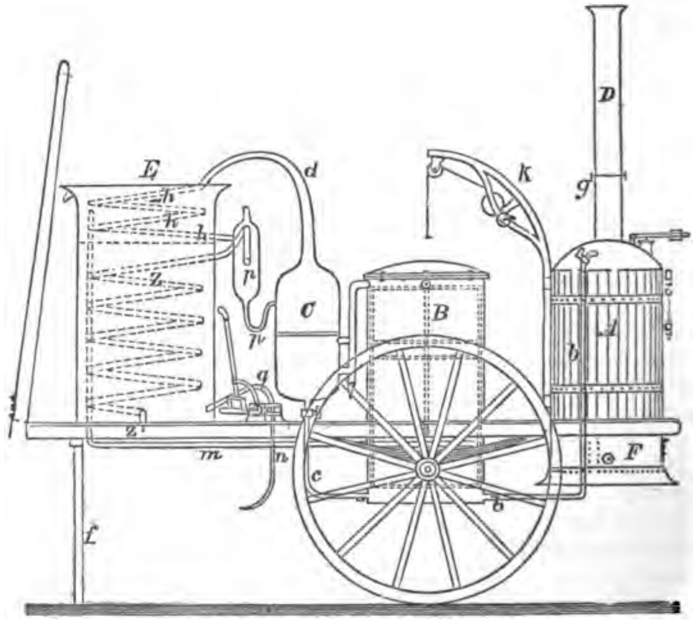


s of pomace. The time required for running a charge of this size om two to two and one half hours.

ortable apparatus will be found very convenient, if the laws of the ntry will permit. Such portable stills are greatly in favor in Italy. g. 5 shows such a still. For this one a gold medal was awarded at International Exposition at Conegliano, in 1881. The still rests on o-wheeled carriage. *A* is a steam boiler; *F* the firing; *D* the chim- passing through the boiler; *B* is a cylindrical boiler, which contains perforated false bottoms, on which the pomace to be distilled is ed; *K* is a crane for handling the pomace; *C* is the doubler, cooled he outer air; *E* is the cooler with a worm; *p* is a small doubler with v-wine pipe into *C*. The last portion of the distillate is condensed he worm *Z*. *g* is the pump for supplying cold water to *E*. The er, when it is heated in *E*, is used in the boiler *A* for getting up m, passing through the pipe *m*.

operating the boiler, *B* is filled with pomace and closed tight. m is then introduced through the pipe *b*. The first partial rectifi- on of the alcoholic vapors is accomplished in the upper part of the er *B*. All of that part of the distillate which condenses in *C* is ied back to the boiler through the pipe *c*, and another rectification ccomplished in the upper part of *E*. With this apparatus can be

Fig. 5



produced, including the time of filling and discharging, a produ
from 15 to 17 litres of proof brandy per hour.

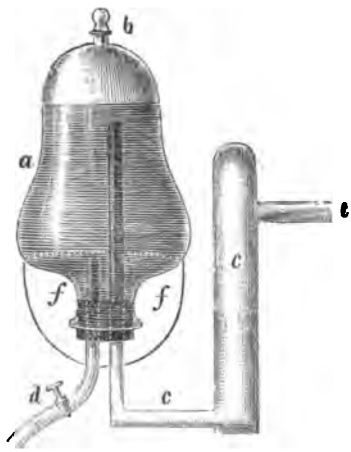
Steam is always preferable for distilling. If fire is used the pro
may be very inferior. With the stills described in Figs. 2, 3, 4, a
a more aromatic product will be obtained than if an ordinary st
used.

The peculiar aroma of wine is due to œnanthic ether. Pure alc
boils at 78.3° C. (172° F.), while œnanthic ether does not boil un
temperature of 225° to 230° C. (437° to 446° F.), and so a great pa
the œnanthic ether remains in the boiler in the usual process of d
lation. With a second distillation of the pomace with very hot st
most of it can be driven off, and if a still like Fig. 4 is used, this
stance can be caught separately by using a small apparatus shown
Such an arrangement is shown in Fig. 6. It consists of the
vessel *a*, having a small opening on the top, and which can be op
or closed at pleasure by the glass stopper *b*. At the bottom there
larger opening, which is closed by a cork. Through the cork tube
run, as shown, into the vessel *a*. Both tubes are of copper or brass
the longer one is bent rectangularly as shown in *c c*. The joint at *e*,
the pipe in the cooler, must be snug and tight.

As soon as the distilled spirit begins to run, the stopper *b* is op
and the stop-cock *d* is closed. The vessel then begins to fill; as
as it is filled, the opening *b* is closed with the stopper, and the cock
opened. As long as the opening *b* is kept tight the vessel will
empty, and still the distilled spirit passes readily through; *f f* is a
plate designed to give more strength to *a*.

The mode of operation is as follows: When nearly all the alcohol

Fig. 6.



distilled from the pomace, very hot steam is turned in. This drives enanthic ether from the pomace. It is condensed with the steam in ooler, and thence it goes into the apparatus above described. The nthic ether has a lighter specific gravity than water, and floats on surface in the glass vessel. As soon as no more œnanthic ether ers on the surface the distillation is stopped. The œnanthic ether, nted in the brandy, can of course be added. It is soluble in alcohol. is added, the aroma of the brandy will be found to be greatly ased. It gives the well-known cognac flavor so much desired, if randy lays for some time.

stead of the apparatus above described, the one shown in Fig. 7 e employed.

Fig. 7.

is consists of the glass vessel *b* and the tubes *d* and *e*, both of glass. principle is exactly the same as previously described. *b* rests on a d, and can be placed underneath the pipe running from the cooler, to let the distillate run into the funnel *a* of the pipe *e*. Thence it into *b*, where the œnanthic ether gathers in the upper part.

Brandy made from pomace in the ordinary way is the poorest o spirits made from wine. It is thus of considerable advantage to ge the œnanthic ether in the above-described manner, as the quality thereby be considerably increased. The loss of time and extra exp involved will be found more than repaid by the improved quality o brandy.

PRODUCTION OF GAS AND FRANKFORT BLACK FROM POMACE.

After the spirit has been extracted from the pomace by distilla the pomace can be used in the manufacture of gas. It can also be for making a black color, Frankfort black, by carbonizing it in c retorts.

H. W. Ilgen, of Gruenstadt (Palatinate), was the first one whose a tion was drawn to the possibility of utilizing the gas evolved in the cess of making Frankfort black. After several futile efforts he succe at last in finding a method by which he could produce from po previously used for making brandy a gas suitable for heating or ill nating, and then use the refuse for manufacturing Frankfort black. apparatus for making gas from pomace is the same as that used in ufacturing coal or wood gas. Most of the pomace produced in Fr after the spirit and tartar are extracted, is used in the production of In Germany the first step in this direction was made at the gas fa at Gruenstadt, and the result was entirely satisfactory.

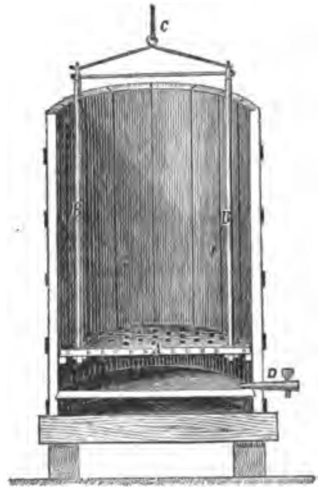
The bye-products arising in the production of gas from pomac essentially the same as the bye-products where wood is used, na pyroligneous acid, ammoniacal liquors, an aggregate of hyroca similar to coal tar, all of which can be used in making creosote, par etc. Before being used, the pomace must be absolutely free from alc through having been distilled, or having the alcohol extracted in other manner—by exposure to the air, for instance—and dry and from mold. The manufacture of gas will be found particularly p able wherever large quantities of pomace are obtainable.

The pomace is pressed as soon as it comes from the still, and, p in wooden frames, is left to dry in the open air. Artificial heat for d is not to be recommended, as the quality and quantity of the gas obt subsequently may be injured thereby. The pomace usually loses half its weight in drying.

Cast-iron retorts for making the gas are best. There is no fear ever from sulphur; as there is in using coal. There is no need he describe the process of gas making. Sufficient pomace is placed in retort to fill it five or six tenths full. The pomace, say from 20 kilos (44 to 110 pounds) at a charge, is introduced into the retort shovel, which is at once withdrawn and the door quickly shut rapid and violent distillation of the pomace ensues. It may re four hours to complete the work, but as a rule the process is more than with coal gas. The only special care is to see that the poma not too dry before going out. The retorts should not be heated than to a dark red heat. Gas stoves will be found to work best in connection, as being better regulated. When the pomace is withd from the retorts it will be found to be of a deep blue-black color, cially if the proper precautions have been observed in making the This black substance gives the Frankfort black of commerce a very

ety black color. If the heat in making the gas has been higher
dark red, the residue will be dark grayish in color.
he distillation in the retorts may be considered as accomplished at
end of one or two hours. The retort is then discharged. As soon
is opened, the gas remaining is lighted, so as to prevent a possible
osion while discharging. The residue must be withdrawn from the
rts just as fast as is possible so as to prevent burning as much as
be. The contents are pulled from the retort with a broad hook,
dumped into a sheet-iron can covered by a tight-fitting lid. This
exclude the air while the residue is cooling. It is not objectionable
ave the can partially full of clear, pure water to facilitate the cooling
ne red-hot mass. The gas is subsequently cleaned and purified in
same way that wood gas is cleaned and purified. The gas lime thus
ined, and other bye-products, are utilized in the same way as bye-
ucts from other gas houses. The experiments at Gruenstadt show
if the retorts are charged with 50 kilogrammes (110 pounds) of
ctly dry pomace, the product will be about 17½ cubic metres (about
ibic yards) of gas of a much greater illuminating power than coal
This is if the retorts are heated to a white heat. With only a low,
heat, a charge of 50 kilogrammes (110 pounds) has produced 15.6
metres of gas of the same illuminating power as coal gas.
ied grape stones, on account of the large quantity of oil they con-
give fully double as much gas as the rest of the pomace, and of
ich better illuminating power.
e Frankfort black, remaining after the gas has been extracted from
ry pomace, amounts to about 25 per cent of the original weight of
omace.
can also be stated here that lees can be used for making gas and
kfort black after the brandy has been withdrawn from them by
ns of distillation.
produce Frankfort black after the retort residues have cooled, the
of procedure is as follows:
e residue is placed in wooden soaking tubs, and hot water is poured
it. All the soluble alkali is soaked out, the process being continued
the liquor above the residue is clear and shows no alkaline reac-
The soaking tubs are the same as those used in producing potash;
is, cylindrical, higher than broad, and the best are made of larch.
g. 8 shows such a tub. There is, as is seen, a double bottom, the
r one—*A*—perforated, and from 15 to 20 centimetres (5 to 7 inches)
e the lower one. The perforated bottom is covered with coarse can-
It is best to supply the perforated bottom with the attachment
n in the cut, to facilitate the removal of the Frankfort black when
ed. This attachment is very simple, consisting of two wooden
s *B B*, which are joined to the perforated bottom and connected
e top as shown, by means of a rope attached at *c*, which is con-
d with a windlass. The false bottom can then be lifted out of the
t pleasure. The liquor, which gathers between the two bottoms,
e withdrawn at pleasure at *D*.
ter the residue has been thoroughly soaked, it consists chiefly of
finely divided carbon and carbonate and phosphate of lime, and a
small percentage of silica.
e residue is ground while wet, as soon as taken from the soaking
, and can then be sold.

Fig. 8.



If it is desired to obtain perfectly pure Frankfort black—that remove any lime that may remain—the residue must be mixed cold concentrated muriatic acid, and then wash several times with water to remove the chlorides that form and the last of the free The black can then be dried and sold. The remaining liquor neutra is an excellent fertilizer.

Should no water have been in the sheet-iron box when the res were removed from the retort, some ash will form around the res in the box, no matter what care is taken to prevent it. These should be separated from the residue before soaking. They ca utilized in making potash, etc., as they will produce from 27 to 3 cent of potash.

Great cleanliness and care are essential to the production of Fran black.

Briefly stated, 1,000 kilos (2,200 pounds) of pomace from the d lery will make about 500 kilos (1,100 pounds) of dry pomace, and quantity will produce 156 cubic metres of gas fully as good as th coal gas, besides products of distillation in the retorts, and from 1 125 kilos (220 to 275 pounds) of pure Frankfort black.

If you will compare the production of gas from pomace with from coal or wood, it will be found—

1. That pomace can be bought cheap in all wine-producing coun especially after having passed through a pomace still.

2. No alterations have to be made in existing gas houses, so pomace can be used while obtainable, and the factories can after return to the regular materials when pomace gives out. This is al done in many gas houses in France.

3. The product of gas from pomace is far greater than from ord coal, and the bye-products are more valuable, the Frankfort black net profit.

4. If it is wished to give particular attention to the production very fine black, which pays best of all, no high temperature is us

process of making gas, and a saving is effected in this respect. Cast- retorts can be used, too, and they will last long, there being no ruction from sulphur. The retorts can also be easily cleaned. It be easily seen that the process is profitable when pomace is cheap available in considerable quantities.

es can also be used in making gas as well as distilled pomace. arly as 1862, R. Mueller, of Kitzingen, used lees for this purpose. are equally as good as the best boghead coal. According to amp, a hundred-weight of lees will give from 400 to 450 cubic feet as, which will give an illuminating power of ten to twelve candles, ing 4½ cubic feet per hour. Six to seven hundred-weight of lees give a hundred-weight of Frankfort black.

USE OF THE GRAPE STONES.

ape stones can be worked up in many different profitable ways. o the present time but little effort has been made to realize their able constituents, and then only to extract the oil from them. This as been extracted for some time in Italy, and in some parts of zerland, France, and Germany. In some places they are used for ng fowls.

e most valuable parts of the grape stones are the oil and the tan- The percentage of oil contained ranges from 10 to 30 per cent; in d climate less; in the southern countries more. Moreover, the of the weather during the growth and maturation of the grapes great influence on the quantity. The stones of blue grapes also more oil than those of the white varieties. The stones from grapes n on young vines will also show more oil than on older vines.

e oil itself is, when fresh, of a bright golden or greenish-yellow , afterward turning brown as it becomes older. It is somewhat , has a mild taste, almost without smell, and is far superior to nut It dries in open air. The specific gravity at 15° C. (58° F.) is 3. It begins to congeal at —15° C. (5° F.), and at —16° C. or —17° turns brown and becomes of the consistency of butter. It burns slowly, but when fresh it can be used as sweet oil or lamp oil. n old it makes an admirable oil for paints; it also makes a splendid when saponified with alkali.

e stones also contain from 5 to 7½ per cent of tannin. This differs the ordinary tannin of commerce, and is to be highly recommended se in fine wines.

e stones are separated from the pomace by shaking and sifting. are then washed with water and quickly dried, otherwise they mold. The drying can be done in open air with frequent turning, a regular drying-room. They can then be kept for a long time.

obtain the oil, the stones are ground fine and the oil pressed out. oil can, however, be best extracted by the use of bi-sulphide of car- or benzine. Both dissolve the oil very easily, and can be driven qually easily by distilling, being used over and over again; nearly ys the bi-sulphide is used at the present time, as much more oil is ned by its use.

e bi-sulphide is poured over the ground stones in a specially pre- d apparatus, then filtered and distilled. The whole operation before ing should be done in a tightly closed receptacle, the bi-sulphide

being very volatile. The remaining powder can be used for the ext tion of tannin. After the oil and tannin are extracted, the residue be used in making Frankfort black.

A tannic extract of the grape stones can be used in wine instea pure tannin. To make this one litre of 80° proof spirit is added to e kilogramme (2.2 pounds) of powdered grape stones. Let this di for fourteen days, stirring frequently. Then filter. Add to the st residue half as much water as was originally taken of spirit, anc this digest eight days more. Filter again, and the two filtrates mixed for use. In this manner a tannic extract is obtained from stones, which is of great value in cellar operations.

From 2 to 3 litres of this extract will be found sufficient to clear 1 litres of thick wine. It can be clarified with gelatine or isinglas case the tannic extract does not perform the work perfectly.

In France grape stones are often fed to horses and mules. H. M and T. Bauscaren ("Moniteur Scientifique," 1866, p. 188) publishec results of experiments made,and recommended that grape stone used instead of oats. The value of grape stones for feed arises their content of protein substances—fat, as well as potash and p phoric acid.

One thousand kilogrammes (2,200 pounds) of grape stones and contain:

	Ash.	Potash.	Lime.	Phosp Ac
Oats	30 kilogrammes, in which are	5.42 kilos.	1.12 kilos.	6.15
Grape stones	28 kilogrammes, in which are	8.07 kilos.	9.48 kilos.	6.72

One hundred parts of stones contain:

	Fresh Stones.	Drie 105 de (221 de
Dry matter	61.00	
Protein	9.11	
Fat	9.90	

J. Nessler also recommends that the stones ground in the ab described processes, and with the tannin extracted, be used as a fertil It will also be found that the grape stones are one of the best food fowls. All this shows the value of grape stones, and yet but l attention is paid to realizing on them.

CHAPTER III.

METHODS OF USING POMACE IN THE PRODUCTION OF WINE.

The smaller producers of wine should give particular attention to following directions for turning their pomace to practical use. different methods are separately mentioned in order that all may advantage of them, according to the quantity of pomace whic

ilable for use. Everything has been omitted which calls for any ensive apparatus or great technical skill or knowledge, and methods 1 as can be employed by any wine producer are given; at the same e sufficient attention has been given to the utilization of everything ractical value, with the least possible cost.

Iost wine producers do not have the time during the vintage to use pomace, and it must be preserved without rotting until such time as wanted. Pomace ordinarily warms up and starts to ferment within days after pressing, with the formation of acetic acid (vinegar). pomace can be kept, however, in tubs or barrels covered over. The ace must be packed tight into these receptacles. The nearer these made air tight the better. If the pomace is to be first used for mak- brandy, a little spirit can be sprinkled in while packing, if the ace is not at once placed in the still. Fresh grape leaves should be ed over the top of the pomace in the packages, and over this a thick ring of clay, which must be kept moist to prevent cracking. The ptacles should be kept in a cool place, and as a rule it is best to e them under ground. The main desideratum, in any case, is to ent the air from circulating in the mass, which will certainly lead ie escape of the alcohol, and loss by mold and acetic fermentation. mace, if kept air tight, will remain unchanged for a long time, and not be worked up until winter time, or at any other time that suits convenience of the wine maker. The contents of each receptacle of course, have to be worked up as soon as it is opened.

many places pomace brandy is made and the remaining pomace ward used for fertilizing the vineyard. The potash and phosphoric contained really represents all the fertilizing power of the pomace. thers it is used for making cream of tartar; in others for making ıkfort black, as above described.

henever the production of brandy is not desired, it is by all means e recommended that the pomace be used for making after-wine uette), as in this way much of the alcohol remaining is turned to tical use, and the pomace remaining can go into fertilizers or used naking the black. Again, vinegar can be made from pomace after fter-wine is made.

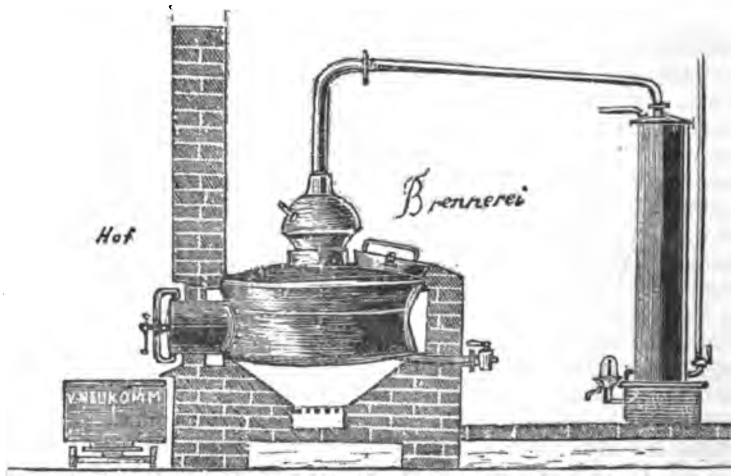
e will now take up these subjects one by one.

PRODUCTION OF POMACE BRANDY.

hatever has been said in the previous chapter about making brandy pomace on a large scale, applies equally well on a small scale. never small producers make brandy they usually do it in an anti- ed, unreasonable way, and they do not begin to get the full value e residue. Nearly all of the old-fashioned stills consist of a kettle, et, and cooler, arranged in the crudest fashion. The devices for filling discharging are poor, taking up much time in manipulation, and product is almost invariably poor and low in proof. By using such ll the operation is seldom profitable, and the consumption of fuel time is a most serious matter. The same conditions requisite in lling on a large scale apply with equal force here; *i. e.*, quality roduct, high proof, and saving of fuel and time.

will only mention two stills that are adapted for the use of the l producer. Fig. 9 shows a practical still—practical, because it has

Fig. 9



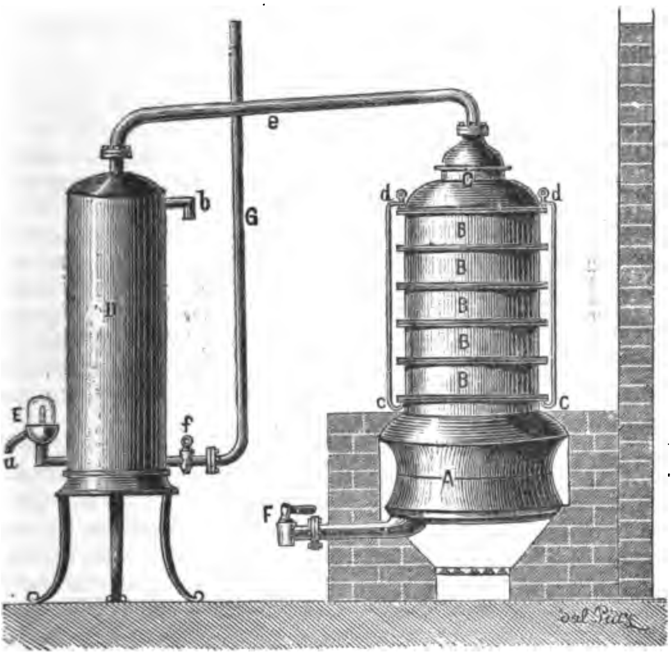
a large opening on the side for discharging the spent pomace. N
the helmet is a large opening for charging the still, and at the b
of the still is a pipe, through which burnt sediment, lees, etc., c
drawn off. The emptying and filling, therefore, does not require
time. The water in the cooler is supplied by suitable pipes, and
running in at the bottom and out at the top. Such a still has a ca
of 560 litres, and a charge can be run through in from two and on
to three hours.

As has already been mentioned in reference to large stills, the
steam is to be recommended. Direct firing is apt to cause burn
the pomace, and consequent bad taste and smell of the product.
may not pay small producers to use steam, the still of Cũrañdeaũ
be recommended. No burning of the pomace can occur in this
though direct firing is employed.

Fig. 10 shows such a still. It is a column still, consisting of the
A, over which is a cylindrical column *B*, *B*, *B*, *B*, *B*, each portion
separate and having a sieve-like bottom. In a small apparatu
still is about one metre (thirty-nine inches) high, and the cylin
compartments fit exactly one within another. On top is the helmet
the compartments are kept together by the braces *d c*. The stea
alcohol go through the pipe *e* to the cooler *D*, where they are cond
and run off at *a*, after having passed the alcoholometer at *E*.
supply of cold water which passes through the pipe *G* into the co
regulated by the faucet *f*, and the heated water runs out at *c*. Th
etc., are removed from *A* at *F*.

To fill the still, the first compartment of the column above the
is filled with pomace. Then the second, and so on. The rema
liquor, if any there be, is poured on top of the pomace in the top
partment. The helmet is adjusted, and the still is braced togeth
the rods *d c*, *d c*. As soon as the water in the boiler begins to evap
the vapors pass upward through the sieve-like bottoms of the s
compartments, and the alcohol is soon carried off. It is best to

Fig. 10.



xtra column of compartments for each boiler, if the laws will permit, at while the alcohol is being boiled out of one set, the others can be harged and refilled.

is distilling apparatus not only allows the distiller to use direct g on a small scale, with the advantages accruing from the use of n, but the distillate can be obtained of high proof from the start.

ith the two attachments for gaining the œnanthic ether (described gs. 6 and 7), the producer is enabled to save this product with his l apparatus. The attachments are placed on the still as soon as all alcohol is distilled, in the manner previously described. As soon l the œnanthic ether is obtained, which can be told by the stoppage e formation of new drops of it in the attachment, the process is over. œnanthic ether can be used for improving the quality of the brandy e manner previously described.

steam is used in distilling pomace it is not necessary to add any r to it, but if direct firing is employed water must be added to pre- burning and to facilitate the operation.

improvement can be made in the brandy by pouring over the ace, before the distillation, a concentrated solution of grape sugar water—or fermented solution—as the quality of the brandy and quantity of the distillate can be greatly increased thereby.

ne best method of preparing this is as follows: For every 100 kilos pounds) of fresh pomace from the press, take twelve crushed quinces edium size; add the quinces to a mixture of 50 kilos (110 pounds) ape sugar dissolved in 3 hectolitres (about 80 gallons) of water, and

pour the mixture over the above quantity of pomace. Let this ferment for eight weeks in closed fermenting vats, or in closed ba arranged as described in a future chapter. The quinces will be f to give a most delicate aroma and flavor to the mash.

After the mash has fermented out it is distilled. The alcoholic uct will be found to have increased very materially, and the brand be very aromatic, and after some time in warehouse will be four resemble cognac very strongly. It can even be sold as such. method of distilling pomace and grape sugar will be found even profitable than that of using pomace direct.

After distillation it will be found that many valuable potash and salts remain in the liquor and pomace, the most valuable of whic the tartrates. When the hot solution as it comes from the pomace cools off, the so-called *cristaux de marc* crystallize out. In many p in France and Italy this process is carried on, but it is not near extensively done in the Palatinate. A very common method is t out the pomace, and when the tartar has crystallized, sift it out. coarse crystals are afterward refined.

It is still more advantageous to press the pomace as it comes fron still (and while warm), and evaporate the liquor which comes fro until a scum forms on the surface. Then put the liquor in wooden and the tartar crystallizes out on the sides and in strings. Fresh li from the still is added to the remaining brine, after the crystals been removed, and the process is thus continued as long as the runs. The process is very simple, and is profitable to all who wo it. The crystals are dried and sold.

Valuable potash salts may be obtained afterward by neutralizin remaining liquor with carbonate of lime, and stirring and hea Chloride of calcium is then added, and the potash salts are crystal out.

The pomace, after the extraction of the brandy, the œnanthic e and the tartar, can still be used for fuel or manure, or for makin Frankfort black.

AFTER-WINE (PIQUETTE).

If the producer does not wish to make pomace brandy, or any o bye-products mentioned in connection therewith, the best plan is to after-wine (piquette) from his pomace.

As already stated, no matter how great the pressure applied to ace in the wine press, alcohol or sugar, as the case may be, will re in the mass. This is especially true when the seasons are favora the development of a high saccharine content in the grapes.

The juice remaining can be fully extracted by means of wate well as certain tartrates and other potash salts.

In making after-wine according to the Petiot system, the best re of any are obtained. Unfortunately, this system has not been us any extent outside of France, and this is one of the reasons wh French produce such a cheap, ordinary wine of a uniform chara Considering the unreasonable opposition which invariably meets new meritorious proposition, the Petiot system will always require to be introduced, and particularly in Germany and Austria. It is li however, that this rational system of making after-wine will be i

ed in most wine-producing countries, for almost everywhere pomace sed in some manner for making a cheap wine for family use.

ven in the days of the old Romans a beverage was made by ring water on pomace. It was called *lara*, reminding one of the "Lauer," or "Leier," by which it is now known in some countries. ustria it is called "Hansel" and "Glauer," and in Italy an after- is made which is called *vino piccolo.* There, however, the pomace t pressed, but the juice is merely allowed to drain out, after which qual quantity of water is poured on the pomace. This method of ing after-wine might be called an imperfect Petiot system.

e usual method of making after-wine is to add water to thoroughly sed pomace, and to let the mass stand for several hours, after which pomace is pressed and the wine used for immediate consumption. wine will not keep, on account of the small percentage of alcohol ained, and it always tastes of the pomace.

more rational method will enable the producer to make a wine that d years may even approach the first pressing in quality, and may be blended with it. In good years, when the grapes get thoroughly before picking, the after-wine may be made of very good quality. ral methods are proposed. Either some water, in which grape sugar ne sugar is dissolved to the limit originally contained in the must, ured on the pomace, and fermentation is allowed to proceed; or as alcohol is added to the water as you desire in the wine, and the ace is allowed to digest in this solution of alcohol and water.

it is wished to let the pomace ferment with sugar and water, cane r will be found better than grape sugar, as the grape sugar of com- e generally contains only about 60 to 75 per cent of sugar that be fermented, the balance being unfermentable substances and r. On the other hand, ordinary cane sugar contains at the utmost o exceed 5 per cent of water and other substances. Although cane r is more expensive, less will be needed to secure the desired quan- of alcohol in fermentation. Moreover, five parts of cane sugar will as much alcohol as six parts of pure grape sugar by fermentation. ne sugar is thus but little more expensive than grape sugar, and e is to be advised further, because no foreign substances are intro- d into the wine, and time is saved by the greater readiness with h it dissolves.

alcohol is added instead of sugar—and this is by far the most litious and satisfactory way—use only the neutral spirit of wine. n be produced easily in any wine-growing country, and can be tested easily in regard to strength and cleanliness than the sugar. The ss is also simpler and cleaner.

avoid as far as possible the taste of the pomace in the after-wine, ist be used just as soon as it comes from the wine press, and they not be allowed to ferment one instant. It is advisable not to the first time too hard, as all the valuable ingredients are extracted e later process anyway. If it is absolutely impossible to work up omace at once, it is urged that it be sprinkled with a little spirits ine before use.

e process of making after-wine is very simple, and no apparatus than that ordinarily found in wineries is needed. Should the ucer have large fermenting vats, they will be found very convenient, n ordinary barrel will do. The vat or barrel should be mounted a

little above the level so as to permit of easy access below, and the bo of the vat should have a bung-hole well stoppered and covered above with grape stems, or leaves, to prevent the pomace runnin with the wine when it is drawn off.

The vat is filled about two thirds with fresh pomace, and over poured the sugar and water until the vat is nearly full. A cov then placed over the vat with a fermenting bung. This preca makes acetic fermentation impossible.

During the fermentation the temperature should be maintain from 12° to 14° Reaumer (58° to 62° F.).

The pomace and sugar and water may ferment out in three or days, but if the temperature above noted is maintained it may from six to eight days. If water and alcohol are used instead of and sugar, the mass should be allowed to digest about four days, ing covered as before, and with a fermenting bung.

As a rule it is not desired to have the alcoholic strength of the wine very high, and an 18 or 20 per cent solution of sugar and will be found to meet all requirements. For preparing an 18 per solution, about 30 kilos (66 pounds) of grape sugar will be need every 100 litres of water. If cane sugar is used, 20 kilos (44 pou will be found sufficient.

If it is wished to make a lighter wine a 16 per cent solution wi To prepare this, about 25 kilos (55 pounds) of pure grape sugar, kilos (38 pounds) of cane sugar, to 100 litres of water should be t Grape sugar varies considerably in its content of water, and wher sort of sugar is used, a saccharometer had best be used as a test, bu result even then can be said to be only approximate, as the comm grape sugar always contains foreign substances.

The content of tartaric acid can also be calculated, so that yo add any that may be deemed necessary.

After having gone through the process as above described, and ta off the wine at the bottom of the vat, the pomace remaining is means exhausted. Water and sugar, or alcohol and water, can be a three or four times more.

The after-wine obtained in this way on the second or third time i inferior to the first, but has even more flavor and aroma. Howeve best way of making after-wine is as follows:

Place 4 hectolitres (105 gallons) of pomace in a vat, and add litres of water, mixed with 120 litres of 80° spirits of wine, 10 kilo pounds) of cane sugar, and 4 kilos (9 pounds) of tartaric acid. Le mixture stand for five days at a temperature of from 15° to 18° mer and then tap off the liquor. By adding sugar a fermentation up, which facilitates the extraction of the flavoring matter from pomace. With this method the pomace can be used several times If blue grapes are used, of course the wine should remain on the po somewhat longer in order to extract all the coloring matter pos After taking as many runs of wine from one lot of pomace as is de the vat is emptied and the pomace put through the press. The po can then still be used for making Frankfort black, or for fuel or f izer.

The quality of after-wines produced by these different methods i little different from natural wine. They contain, of course, but acid, and if perfectly ripe grapes have been used the deficiency is

ked, and had best be supplied by the addition of some acid to the er standard (5 per 1,000).
fermented too long the after-wines are apt to contain too much acid. o much tannin is present it can be removed with gelatine.
e cellar management of after-wine does not differ from that of other s. Such wines are a cheap and healthy beverage for the vineyard s. Whenever made from the pomace of the best grapes they can be blended to advantage with poor wines, greatly adding to their ty. I would recommend the production of after-wine wherever pos- as one of the most rational methods of disposing of the pomace.

PRODUCTION OF VINEGAR FROM POMACE.

out two centuries ago the well-known Dutch philosopher, Hermann aav, introduced a method for making vinegar from pomace. The od consists in placing grape stems and pomace in two upright s, one filled completely full and the other half full. Wine is added iently to enable the pomace to be poured, and the contents are then antly poured from one tank to the other. This brings all the mate- into contact with the air, and acetic fermentation sets up very kly.
is system of Boerhaav has been modified by the eminent Schuetz- ch, who invented specially constructed vinegar tanks, and who diluted spirits and beechwood shavings instead of wine and pomace. is the so-called rapid method of making vinegar, and the great of the vinegar of commerce is made in this manner. It is profita- because the product considerably resembles wine vinegar, and the rials are cheaper.
t wine vinegar commands a high price, and if you are going to ufacture it some modification of the Schuetzenbach tanks is advisa- I would recommend producers who have no sale for their light wines to experiment with vinegar making and the vinegar market. not speaking of those wines which, through carelessness in hand- are already rancid and fit for little else.
gs. 11 and 12 show the most judicious arrangement of the vinegar for handling pomace. They resemble very much the tanks in the vinegar factories, and are based on the same principle; *i. e.*, are so devised as to bring the material as much as possible into ct with the air.
A are two tubs of oak. In order to bring plenty of air into the nd keep it there, four perforated bottoms, *a*, *a*, *a*, *a*, are placed in tub. The bottom of the top tub, *B*, is pierced with two holes, into n the strong glass tubes, *F*, *F*, are fitted. *D* is the discharge pipe with a faucet. Around each tub are five rows of holes *b*, *b*, *b*, etc., from two to three centimetres in diameter, and bored obliquely rd the center of the tubs, preventing any escape of fluid through , and at the same time admitting air. *B* is hooped with wooden s.
fore using the tubs the pomace is allowed to ferment in open air. the lower false bottom is put in place, filling up to the level of second false bottom. Then the second false bottom is put in, and . The top, or filling tub, is then put on top, and the cover *C*. This , the percolating liquor (either light wine or largely diluted alcohol)

Fig. 11.

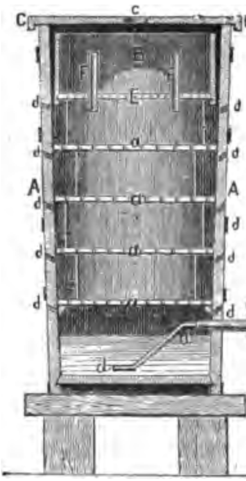
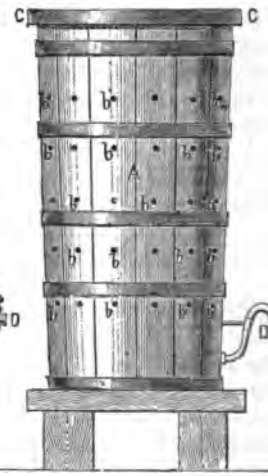


Fig. 12.



is allowed to pass in at *c*. About a 6 per cent alcoholic solution wi
found strong enough. Considerable heat is produced on adding
liquor, and any evaporation passes through the tubes *F*, *F*.

The temperature may reach as high as 28° Reaumer, and even n
but it is preferable not to let it rise any higher than can be avoide
as to preclude the loss of alcohol and acetic acid. On the other h
if the temperature is too low, the alcohol may pass clear through
tub without change. The operation should be conducted in a temp
ture of from 15° to 20° Reaumer.

As will be seen in Fig. 11, the liquor aggregates in the space bet
the lowest false bottom and the true bottom. The tube *d d* is be
as to get the lowest portion of the vinegar in the tub. Vinegar h
higher specific gravity than the alcoholic solution, and so it sinks
to the bottom of the tub.

In Fig. 12 the discharge pipe *D* is shown as a bent glass tube.

The acetification of the alcoholic liquor is not fully accomplishe
running it once through the tub, and, according to the alcoholic de
it may have to be run through several times. It is best to use from
to four such tubs, arranged so that after the liquor passes through
it runs to the next. If the original liquor contains but 3 to 4 per
of alcohol, it will be completely turned to vinegar by running thr
two tubs.

These vinegar tubs are usually from 1½ to 3 metres (5 to 10 fee
height, and of corresponding diameter.

If wine or an alcoholic solution of 6 to 8 per cent is used the pr
may be completed in forty-eight hours.

A set of vinegar tubs once charged can be kept running for se
months before it is necessary to put in new pomace. But the tubs
never be allowed to stand full of pomace without the process of vin
making going on constantly.

In enumerating the advantages of making vinegar, it will be fo
that by using dilute spirit and tubs charged with pomace, a vin

be produced equal to the best wine vinegar in flavor; that only a dilute spirit or wine need be used; and that even then a strong gar will be produced. Finally, after the pomace is taken from the it is still available for fertilizers, etc.

MANUFACTURE OF ŒNOCYANIN.

mace from blue grapes always contains a large quantity of coloring er, which can be extracted and used for coloring red wines that are ale. Œnocyanin is a component part of the skins of blue grapes, n its natural state is a pure blue, turning red on the addition of . It is not soluble in water, alcohol, or ether, but dissolves in ol mixed with tartaric acid.

e color of the resultant liquor when dissolved varies according to uantity of free acid present, being of many shades, such as blue, blue, or red in its many varieties. By adding alkali until the is neutralized, the solution will turn blue, but an excess of alkali uin the color.

s to be recommended that the coloring matter be extracted when- ossible from the grape skins, as by rights this is the only color hould be used with red wines showing naturally a poor color. In ng wines by the system of Petiot, it should be used with the alcohol ater.

e method of extracting the coloring from the skins is by means of ol, water, and some tartaric acid. By using the following method, vintner will be able to get the coloring for his own wines from his omace:

e stems are separated from the pomace by means of sifting, and tones are separated, as far as possible, in the same manner, or by ng the pomace in plenty of water. The skins are then pounded a wooden pestle, in small quantities at a time, so as to tear up the ng cells in the skins. The thoroughly macerated skins are put in with dilute alcohol and tartaric acid. About 12 litres of clean s, afterwards diluted, to every 10 kilogrammes (22 pounds) of ce and 175 grammes of acid, will be found about the right pro- n.

e mixture is allowed to digest for three or four days, and then put gh a strong crushing machine. To get still more coloring matter, esidue is again treated with a little spirit (about one half of what sed the first time), and again crushed. The coloring matter thus ned is kept in glass, in a cool, dry place. It imparts a deep color le-red wines, and not only does this, but adds to their flavor. It y improves the product in bad years.

obtain a more highly concentrated solution of œnocyanin, a separate gement for distilling will be needed, and distilling should always orted to in the larger factories. The process is begun as described , using instead 90 per cent spirit and 5 per cent tartaric acid. This ss calls for the use of well-tinned copper boilers, and arranged to the evaporating alcohol to be caught and saved.

er letting the mash of skins, alcohol, and acid digest for five or six , it should be crushed in a powerful, but small press, and re-treated. olution thus obtained is placed in a still and reduced to one tenth original volume, the alcohol being caught in a suitable cooler. To

every ten parts of the condensed solution of œnocyanin should be four parts of high-proof spirit. From 1 to 2 per cent of this so thus obtained is sufficient to color any wine a dark red. Skins em in making œnocyanin must be used in a fresh state, and as soon a come from the press. Should this be impossible, they may be k short time by first removing the stems and stones and then pack barrels, with a little spirit added.

MAKING VERDIGRIS.

The production of the common, or so-called blue French verdig the use of pomace and metallic copper, consists in piling up sh copper with pomace which has undergone acetic fermentation, in b or earthen vessels. The crust of verdigris which forms on the c is scraped off from time to time. This method is used principa the wine-growing districts of southern France. The productio not, however, form a separate industry, and is generally counted b wine producers as a side business, especially in the vicinity of pellier and Grenoble. In that portion of France nearly every maker has his verdigris cellar, and nearly all the operations are by women. In other countries of Europe the production in this m is inconsiderable.

There is another method, though mostly applied in German England, which will be mentioned at this time, but which doe properly belong within the scope of this work, as it does not deal the utilization of wine residues. In this method copper plate piled on flannel dipped in vinegar. The flannel is wet every days. After fourteen days the copper plates are removed from the nel, and are occasionally wet with water. After the expiration or six weeks the plates are scraped off. This method gives a very green verdigris.

In the French method the pomace must not be crushed too muc must not have been used in making after-wine. The pomace, first is placed in barrels, about 45 centimetres high and 30 or 35 centin broad. The acetic fermentation is completed in these barrels, an temperature may rise as high as 35° to 40° Reaumer (110° to 122 Should the acetification be too slow, it may be hastened by stirrin pomace, and heating the room in which the fermentation is ca on. Too rapid fermentation is to be avoided, however, as involvin loss of much alcohol and acid.

To ascertain when the pomace contains sufficient acid for the p to begin, a plate of copper is placed in the mass. This shoul covered within twenty-four hours with an even, green coat. "blisters," that is, if it shows green drops on the lower side, the perature of the pomace is too high, and twenty-four hours should before another test is made.

The plates used in France in the manufacture of verdigris are 11 to 16 centimetres long, 8 centimetres broad, and 1 millimetre t The remnants of ship sheathings are largely used in the proce cheap copper is an absolute essential to the profitable operati the process. If ship sheathing remnants are used, they shoul hammered somewhat thinner than they are usually made, and coating of copper oxide that always forms on copper is thereby rem

should also be rubbed off with linen dipped in vinegar, and before use; otherwise they are apt to turn black. Sometimes, in ern France, burned clay pots about 45 centimetres high and 35 metres in diameter are used in the process, instead of wooden barrels. e copper plates are first heated to a temperature of 30° to 40° mer before an open fire, and are then piled in the barrels or pots yers, alternating with pomace. At least 3 centimetres of pomace d intervene between each lot of plates. In this way from one red and twenty to one hundred and sixty of these plates can be d in each pot, weighing altogether from 15 to 20 kilogrammes (33 pounds). The pots are covered with straw, admitting the air , and are permitted to stand without handling from two to three in a cellar having a temperature of from 10° to 20° Reaumer o 74° F.).

soon as the pomace appears white on top, the process of the forma- f verdigris is completed, and the copper plates then show the cover y, green, crystalline coating desired. The copper plates are then ed, cleaned, dipped in water diluted with vinegar, and are placed ng against one another on boards in the cellar.

s process of dipping and drying is repeated six or eight times a for several weeks. In this way the crystalline covering is gradu- urned into the light blue, and the verdigris crust is formed, which n 3 to 4 millimetres thick.

s crust is scraped off with copper knives and kneaded with water ooden trough. The kneaded mass is put in leather bags about ntimetres long and 25 centimetres in diameter, and pressed in e frames. They are then permitted to dry in the air and sun, he mass will lose from 40 to 50 per cent in weight.

copper plates can be used several times until they are very thin. s way with every operation the product of verdigris will be about 15 kilogrammes (26 to 33 pounds) from every 100 kilogrammes pounds) of copper plates. According to St. Pierre, the product hectolitres (80 gallons) of moist pomace is about 41 kilogrammes unds) of moist verdigris, which is equal to 20 kilogrammes (44 ls) of the well-dried article. The blue verdigris produced there contains grape stones. The pomace, after use in this process, is vailable for fuel.

POMACE AS FODDER.

rly everywhere in Europe pomace is used for fodder. Cattle, sheep, ogs eat it readily. In many places the pomace is fed just as it from the wine press. In many localities the pomace is preserved t, using half a kilogramme (1.1 pounds) of salt to every hectolitre gallons) of pomace, and adding water until it stands over the of the pomace. It is advisable to sift or wash out the grape stones preserving the pomace, as they are rather difficult for cattle to .

ed pomace can also be used for fuel, in which case the cheese, as it from the wine press, is cut into thin slices and dried quickly in r. In feeding, these dried cakes should be cut into small pieces, l with chopped hay or straw, and made into a boiled or steamed . This makes the pomace more digestible.

e stones are excellent food for poultry.

Even the pomace after coming from the pomace still makes goo
but is not as nourishing as fresh pomace. Experiments made in
have shown that 160 kilogrammes of fresh, unfermented pomace,
kilogrammes of fermented pomace, or 300 kilogrammes of distille
ace, have each the nourishing value of 100 kilogrammes of the bes
hay.

The relative value of pomace for feed can also be seen by the
ing tables:

On an average, 1,000 kilogrammes of the following:

	Ash.	Potash.	Lime.	Ph
Oats	30 kilogrammes, in which are	5.42 kilos.	1.12 kilos.	6
Grape stones	28 kilogrammes, in which are	8.07 kilos.	9.48 kilos.	6
Grape skins	40 kilogrammes, in which are	17.70 kilos.	8.40 kilos.	7
Pomace	27 kilogrammes, in which are	9.96 kilos.	2.88 kilos.	2

In one hundred parts of the components of pomace, there are co
(dried at 105° C.):

	Skins and Stems.		Sto
	Fresh.	Dried.	Fresh.
Dry substance	50.00	100.00	61.00
Proteids	7.31	14.52	9.11
Fats	2.99	5.98	9.90

This shows that there is about 8 per cent of proteids and 6.4 p
of fatty substances in one hundred parts of fresh pomace.

Salting makes the pomace more digestible for animals, and
been shown that 2 to 3 kilogrammes (4.4 to 6.6 pounds) of pomace,
with a corresponding quantity of straw, is sufficient for one f
of an animal.

Although pomace makes fair food, almost any other way of dis
of it is to be commended as more profitable, and only in a few ins
and under peculiar circumstances is such a manner of using it u
advised.

POMACE AS FUEL.

After having used the pomace in making after-wine, or bran
vinegar, as the case may be, the remaining substance can be u
fuel. In countries in which the fuel supply is short and prices are
as, for instance, on the Rhine, this is what is generally done w
spent pomace. The ashes can still be used for fertilizing, cont
much potash and most of the valuable materials for manure.

The best means of attaining this end is to shape the pomace in c
cakes in molds, or like bricks. The best size for the bricks is 25
metres long, 10 centimetres broad, and 8 centimetres thick, whic
most convenient size for handling. The best plan is to let the p
lay some time after it leaves the press, until it is a bit black an
It can then be pressed into the wooden molds provided for it, u

simple press; and the cakes are piled in a dry and airy place pro- from rain.

thoroughly dried cakes produce a lasting and hot fire. They can ed almost anywhere that heat is desired—in ordinary stoves, in ng boilers, and under a still which calls for a steady and lasting Wine producers ought to pay more attention to this method of ng fuel. Expenses are reduced all around by doing so. Potash e removed from the ashes of pomace as described under Fig. 8. If ions are conducted on a large scale many of these tanks will be d, but in a small plant two will be found amply sufficient. The are filled with sifted ashes, and enough water is added to one to about 4 centimetres above the top of the ashes. The leaching s continues for about twelve hours, when the lye water is drawn It is then added to the ashes in the next tank, and the leaching s is repeated until the water contains from 20 to 25 per cent of matter. The lye can then be boiled out in flat iron pans, stirring ntly. The potash soon crystallizes out as a brown substance ed by organic matter), containing from 6 to 10 per cent of water. is the raw potash of commerce. If thought desirable it can be ed, which drives off the water and destroys the organic matter colors it. The stoves used for calcining are built like an oven, fire front and back playing over the potash, and the operation only a few hours. Wood must be used in this process of calcin- nd the heat must be increased very slowly. Melting of the potash by all means be avoided, as to melt it greatly injures its value.

thousand parts of fresh pomace will produce about 1,000 parts of In burning this you will get from 125 to 130 parts of ash, from from 22 to 27 parts of raw potash can be obtained, which in turn 3 to 10 per cent of its weight by calcining. After leaching out the the substance remaining consists of carbonate of lime, phosphate e, magnesia, siliceous acid, etc., and is still valuable for manure, he phosphoric acid contained in it. It must be noted that if this s of extracting potash is to be made profitable, cheap fuel for g and calcining must be available. Bricks of pomace can be par- used in the calcining, and altogether in the boiling.

FERTILIZING VALUE OF POMACE.

he wine maker has no other use for pomace he had best use it as re. In this manner many ingredients of the soil that are indis- ble are returned to it after being extracted by vineyard cultiva- It is not of much consequence whether the pomace is used in the ways enumerated above before being returned to the earth or In any event the material still contains all of those mineral dients, *i. e.*, phosphoric acid, etc., which go to constitute a valuable zer. As far as the fertilizing value is concerned, there is absolutely ference between the distilled and the undistilled pomace. How- making cream of tartar from the pomace diminishes the value of aterial as a manure, as some of the potash is thereby lost.

erever the vineyards are situated on thick clay it is by all means able to loosen up the soil with pomace which has been through the of tartar works, or otherwise. For such vineyards it is advisable ead the pomace over the soil to a depth of 3 to 5 centimetres, and

plow or cultivate it under. In this way the surface is loosened some time, and is more accessible to atmospheric influences. A short time the beneficial effect of such amelioration of the soil be very marked. The leaves look healthier and greener than befor production is eventually stimulated. The decaying organic stimulates growth of vines and improves meadows as a mat course.

It is a very good plan to mix pomace with ordinary stable manu use the mixture in the ordinary manner. It is also advisable t the ashes remaining after burning the pomace bricks with stable m as the most convenient method of applying it to the soil. To u ashes alone on meadows, they should be kept in a dry place until spring, when they are sprinkled on the turf.

The leached ashes from which the potash has been taken are good fertilizer for clover.

CHAPTER IV.

UTILIZATION OF LEES.

Lees is the brownish or yellowish substance which separates fron during the alcoholic fermentation, or after as a foam or sedimen which consists not only of different solids, but of the fermenting isms which are produced by, or give use to, alcoholic fermentation. appears during the first fermentation of grape juice, as well as la at the second fermentation, and the dregs, when settled, carry fro 8 per cent of the fermented wine. Next to the cream of tarta among the most valuable bye-products in wine making. To go in particulars of the composition of lees one must refer at the sam to the process of fermentation.

Everybody knows that the must of grapes, if left to itself, und radical changes. Previously clear, it becomes muddy, and ca acid rises in bubbles from the fermenting mass, causing the fo The temperature of the fluid rises, and at the same time the p vinous smell appears, and the sweetish taste of the must disa and is replaced by the characteristic vinous taste.

The physical changes which take place in the must are accom by a great change in the chemical composition. Besides the for of alcohol and carbonic acid gas, and the consequent disappeara the sugar, several stable substances are separated from the flu settle to the bottom with dead fermentation germs, etc. Moreover changes occur which are of little moment to us at this place. cause of all the changes is the fermentation germs, which are ac a temperature above 5° C.

It has been held for forty years that the ferments in the dreg the original cause of fermentation, and even until now there is a v ference of opinion about them. These fungi belong to the lowes table classes; they are very small, .006 to .01 of a millimetre in di and are, of course, visible only under the best microscopes. The from which they spring are floating in the air, and when they g a fluid containing fermentable sugar or protein they develop ve idly. According to the temperature of the fluid, which may rang

15° C., the ferments may sink to the bottom; or above 15° C. they float upon the top. Under the former circumstances under fer-ation sets in, and under the latter upper fermentation begins. ny different ferments are known, but only those of the lees are rtant.

Fig. 13

THE DIFFERENT FUNGI.

l. *Saccharomyces ellipsoideus.*
ws the dregs from new wine, magnified 600 times.
ws the germinating fungi, during the under fermentation, magnified 400 times.
ws the germinating fungi during the upper fermentation.
se with ripe spores.
ws the *saccharomyces apiculatus*, magnified 600 times.
charomyces resii.
ws the red wine dregs, magnified 350 times.

cells have thin, colorless, but plainly visible walls, and contain rless, slimy substance in which little bodies can be plainly seen. ngi all propagate rapidly.

Fig. 13 will be found the different forms of the *Saccharomyces ideus*, the most important of all. Pasteur calls it the "*ferment que ordinaire du vin.*" Considering the low temperature at which fermentation takes place, the vegetable activity of this fungus is eat, but in upper fermentation it takes a leading part. The cell ses are rapidly formed, as shown in *e*. Any one of them in a ntable liquid will form numerous fungoid growths, and this con- as long as there is sugar left to operate upon. When the fer-tion is over, then, and not until then, do the fungoid growths settle

ides fungoids, the lees contain albumen, a considerable quantity trates and tartaric acid crystals, and other vinous acid salts. se compounds represent the valuable constituents of lees. The and potash salts of tartaric acid are less soluble in alcoholic ons than in water containing sugar only. Minute crystals are quently to be found with the lees. Other constituents of the lees e clay, sand, grape stones, and other extraneous impurities.

It is, of course, understood that the composition of lees differs wid according to the different wines used, etc. Braconnet found in lee red wines the following constituents:

	Per
Nitrogenous substances	
Fatty substances { Soft greenish	
Fatty substances { White waxy	
Gum, Red coloring matter, Tannin,	Undeterm
Tartaric acid salts of potash	
Tartaric acid salts of lime	
Tartaric acid salts of magnesia	
Phosphate of potash, Sulphate of potash,	
Phosphate of lime	
Siliceous acid (sand)	
Total	

The transparent walls of the fungoid dregs are elastic, and co mainly of cellulose. The contents are nitrogenous substances, mi substances, etc., partially dissolved and partially in the form of mi grains. According to Payan, one hundred parts of fungus contain

	Per
Nitrogenous substances	
Cellulose	
Fatty substances	
Mineral substances	
Total	

The cell-covering deprived of its contents showed the following cl ical composition:

	Per
Carbon	
Hydrogen	
Oxygen	
Total	

The contents of the cells show the following analysis:

	Per
Carbon	
Hydrogen	
Nitrogen	
Oxygen	

And besides this, the contents carry a small quantity of min ingredients.

The liquid dregs flow thickly, and are brownish or yellowish in case of white wines, and muddy-reddish in red wines. More than of the contents is wine, and even after permitting the lees to settl separate barrels, they will mechanically hold at least half of t volume in wine.

The quality of the wine held by the lees is, of course, equal to th the wine from which the lees was taken. The alcohol is of the grea value of any of the components, and deserves the most attention.

On account of the manifold ingredients, there are numerous wa using the lees. Up to the present time as little has been done in izing on its value as has been done with pomace. The general p

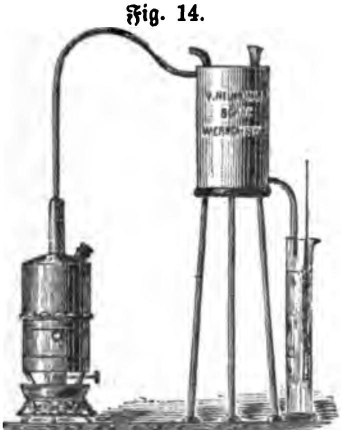
e has been to rush the lees through a still, or to get as much of the spended wine as possible by pressing, and leaving the rest unnoticed. In later years more attention has been given the matter on account the valuable tartaric acid salts they contain, and the realization of ese salts is already a branch of chemical industry. Either the pro-cer or the merchant can utilize his lees and add considerably to his ome by so doing.

VALUE OF THE LEES.

The value of the lees depends on the quantity of wine it carries, percentage of alcohol in the wine, the percentage of tartaric acid, . The alcohol and the tartrates are the main factors which must be nsidered. Lees should be fresh from the wine vats to be of the greatest lue, as on account of the large quantity of organic matter carried is easy to spoil, and may be rendered of little or no value to the tiller or manufacturer of tartaric acid salts. If it is intentionally unintentionally mixed with water, it will lose considerably in value. is not only diminishes the alcoholic content, but may dissolve some the tartaric acid contained. This must be carefully watched in buy-such materials.

Experience has shown that unspoiled lees give just as great a ntity of tartaric acid salts, comparatively, as alcohol. This affords easy mode of determining the value of the lees. For this deter-nation the well-known Salleron still is to be recommended.

Fig. 14.



ig. 14 shows a favorite Salleron. A copper kettle has been substi-d for glass, which was used on the old stills, and a petroleum or it lamp is used in the manipulation. The apparatus is made reby less likely to be damaged. If petroleum is used for heating ead of spirit, a considerable saving is effected.

o determine the quantity of alcohol in the lees the cylinder is filled o the mark with the lees. The apparatus is closed, and is connected 1 the cooler by means of a pipe. The cooler, of course, has a worm, ch is kept cool by running water. The lamp is lighted and the con-s of the still are boiled. Whatever distills over is caught in the

glass cylinder shown in Fig. 14 by the cooler. When the cylinder i to the mark in the middle, the distillation is stopped and the cyl is filled to the top with pure water. There will now be in the cyl as much water and alcohol as there were in the still to start with. alcoholometer then gives the percentage of alcohol in the lees examination. The percentage of tartaric acid salts in the lees is a invariably proportionate to the alcoholic content, and this determin by the Salleron affords such a reliable means of getting at the of the whole that almost any one can estimate it without resorti chemical analysis. If these remarks are remembered, and it is pro by the operator to buy lees, he will almost invariably come out of what he expected.

SYSTEMATIC UTILIZATION OF LEES.

As with pomace, so can lees be used in one manner after another everything of the slightest commercial value has been extracted. process to which most lees are subjected is not by any means an exhau one, and in many cases it is certainly difficult, if not impossible, f producer to get the full value for his material, as it is not in ever trict that tartaric acid factories are to be found which will have any to do with lees. To sell them to distant factories and to ship then scarcely pay, and there is great liability to spoiling and conse deterioration on the way. It is always best for each wine produ make the salts of tartaric acid, or to have some one in each di do the work required within a reasonable radius for all prod Rather than sell to the chemical factories the producer or mer should first use his own lees by pressing the wine from them, then d and out of the residue extract the tartaric acid. The tartaric aci be obtained by the producer with more advantage than by the che factories, as the producer works under the more favorable circumst If the producer does not care to meddle with the production of the salts of tartaric acid, he can dry his sediment after getting ou brandy and wine, and dispose of it in that shape.

As has been said before, only fresh, unspoiled lees can be used fo ducing the tartaric acid. Should it be impracticable to work u material at once, it can be barreled tightly. In a few weeks th will have so settled that considerable wine can be siphoned off.

The lees are then subjected to distillation, and then to the re process of extracting the acid. Formerly only the potash salts an tartaric acid were deemed of value, but now every acid compon extracted, and as a rule, every acid is secured, being first extrac a lime salt. What remains can be used in making Frankfort as before described, or for fuel.

In distilling lees attention should be given to the producti œnanthic ether. How this can be effected in connection with dist has already been described.

If the operator permits the lees to become spoiled to any extent only fit for making vinegar, and even this is apt to be of poor qu The spoiled lees will be found to be of little value for making ta acid salts.

Sediment gives wine a bad taste if permitted to stand for any l of time, and this taste will be communicated to the brandy.

will be found that wine producers, to make the utilization of their pay, will have to work on a different system from that pursued in arge chemical factories which work to the same end.

rcumstances must decide the method of working up the lees. The ıods used when working pomace can be applied more or less with and at times the two can be worked jointly.

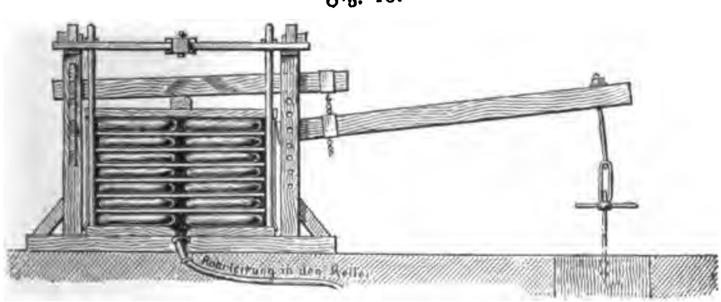
METHOD OF PRESSING LEES.

l the wine that can be possibly obtained from lees should be taken ome time between November and March—the sooner the better. ld the wine stay only half a year on the lees it will begin to acquire ad taste which is so characteristic and objectionable. In former the necessity for fining wine was not known, and the wine used to on the lees until sold, which often meant several years. Of course ine was so objectionable that in some cases the subsequent press- f lees was forbidden by law, and wine, even from fresh lees, was red injurious to health.

ile pressing the lees a cool temperature is absolutely necessary, and ir must be excluded as far as possible.

e pressing should not last over twenty-four or thirty-six hours. rent methods have been devised for securing the wine. Some put ees in a sack, which hangs over a vat, and filter off the wine slowly; his proceeding, although very simple, will give a stale, vinegary ıct. Neither can the method of forcing a linen sack into a tightly vat be recommended. A better way is to fill strong, seamless with the lees, and submit them to pressure in a common wine . The pressing has to be done slowly, for even if the lees is put in le sacks bursting may occur. The best and most practical presses he old-fashioned stone presses which exert a steadily increasing

Fig. 15.



ly lately several machines for pressing lees have been introduced, ıich the so-called decimal press has proved the most satisfactory. 15 represents one of these presses. It is built of larch or oak, is bound with iron. The cut shows the construction of the press fully. Boards are placed in the press between each layer of sacks e pressure is applied. After the operation is over, if the lees will before breaking, it may be taken for granted that a sufficient press- as been applied. The wine is equally as good as that in the orig-

inal vats, but may have to be clarified several times in order to
in first-class condition.

For large factories the so-called filtering press is very advanta

Fig. 16.

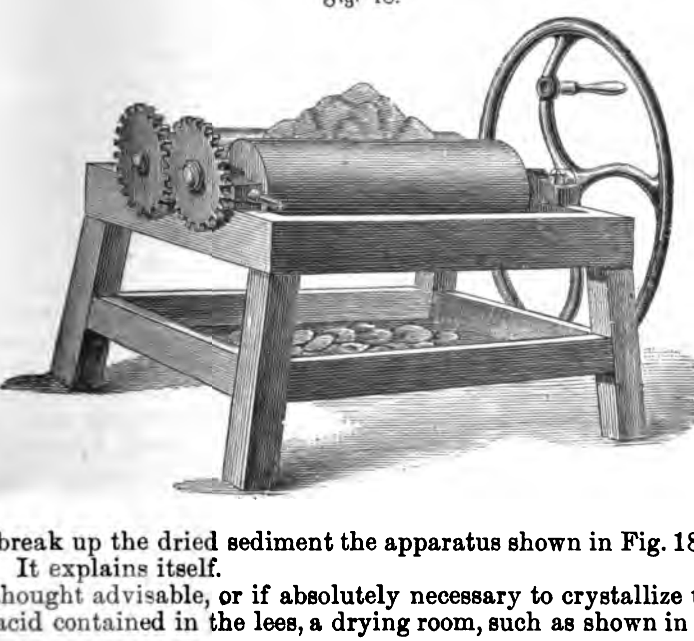
This press (Fig. 16) consists of a number of frames with perf
walls, and covered with a closely-woven pressing cloth. The
are joined together by a screw arrangement, whereby as many fi
chambers are formed as there are filtering frames. The liquid
forced into these filtering chambers by means of a strong force-
The wine first runs off a trifle muddy, but is perfectly clear at la

For pressing small quantities of lees the apparatus in Fig. 17 i
recommended. The cut itself shows the manner of working.

Fig. 17.

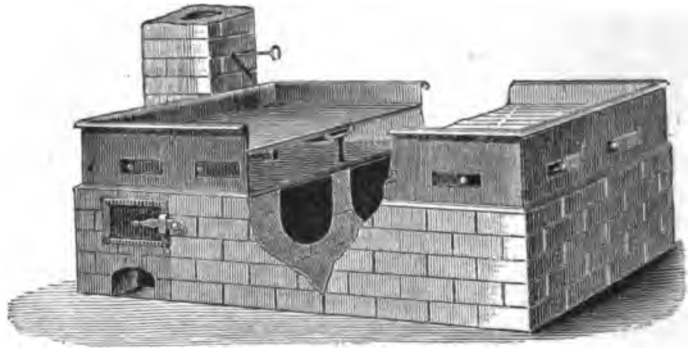
the pasty lees cannot be worked at once, it should be packed
y into barrels, and in this shape can stand long transportation
ut spoiling. The barrels should not be too large—those that hold
150 to 200 kilogrammes (330 to 440 pounds) are best—and petro-
barrels will be found especially useful for this purpose.
uld the producer dry his pasty lees, instead of shipping it, the
g must be done as soon as possible, and is best done in these plates.

Fig. 18.



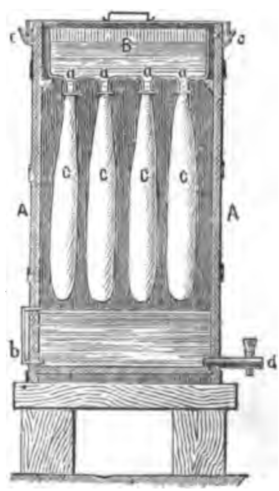
break up the dried sediment the apparatus shown in Fig. 18 can be
It explains itself.
thought advisable, or if absolutely necessary to crystallize the tar-
acid contained in the lees, a drying room, such as shown in Fig. 19,

Fig. 19



will be found adapted to the purpose. The construction of th
show how it is used.

Fig. 20.



A filtering apparatus, such as is shown in Fig. 20, can also b
in extracting the wine from the lees. The process, however, i
The main essentials of this apparatus are the wooden vat *A*, on
rests the vessel *B*, which is either copper or zinc. From the bot
this are hung the filtering bags *C*. The wine is afterwards drawn
d. To keep this apparatus perfectly air tight, the vessel *A* is cove
a tin cover, which has a water joint at *c*.

PRODUCTION OF LEES BRANDY AND ŒNANTHIC ETHER.

Lees brandy is, as a rule, more aromatic than that from p
The quantity that will be obtained from any lot of lees depends
alcoholic contents of that material. With pressed lees obtai
previously described, it will be found that water must be added

ng, to obtain a good product. The amount of brandy that will ained from this material runs all the way from 1 to 4 per cent. randy will always carry any unpleasant flavor that may have ommunicated to the wine by the lees.

handling lees a still such as is described for handling pomace can ployed. Steam heating is always preferable. The œnanthic ether also be saved.

er is also produced from the lees, according to Rautert, in the ing manner:

sediment is filled into large wooden barrels, holding from 150 to los (330 to 660 pounds), to be distilled at the time. The barrel be only two-thirds filled. A strong jet of steam is introduced bottom of the barrel, and both the alcohol and ether are driven e former accumulating in large black drops. The apparatus bed in Figs. 6 and 7 can be used for catching the drops. The dis- on will last about five hours, so that about two runs can be made day. The brandy produced during the process must, of course, sequently rectified.

nake this process pay the lees should be very thick before starting t of steam through it. Otherwise it will be too liquid before the permit the steam to drive off all the ether.

lees, after the process, is drawn off into vats, and the tartar will rystallize out from the liquor. This can be obtained with a sieve.

PRODUCTION OF THE TARTARIC SALTS.

s contain, after pressing and distillation, a considerable percentage tartaric acid, which should be obtained whenever possible. recently this was neglected, but now there is such an active nd for tartaric acid that the supply from the cooperage in wineries roved insufficient, and it has been necessary to turn to other s for supply. Pomace and lees naturally are looked to for supply- e deficiency.

here is no factory for making tartrates near at hand the wine pro- should extract all the valuable acid components of his pomace ees from the liquor from distillation. He can best do this in rm of lime salts, which give the best chance to the factories for king into commercial products the material so obtained. These roducts are so valuable that in case there are no tartar factories y, I would advise the wine producers in different sections to com- nd have some one agree to work up the pomace and lees of all, the distillation of either is over. In this manner the general rity of all persons engaged will be aided.

listilling lees or pomace, either with a direct fire or with steam, rtrates are dissolved in the water, and can be crystallized out when uor becomes cold. These crystals are called by the French *cristaux* and for some time have been saved by all operators. In other days actice was to let the liquor from the stills cool in vats, whereupon ystals would form on the sides. This method takes too much time, consequently too expensive. The best method is as follows: The , with the spent lees or pomace, as coming from the still and while re placed in a wine press (if lees is present bags must be used as and all the liquor is pressed out.

This contains the tartaric acid, as well as other acids. Whi warm it is run into vats or tubs, and on cooling the tartrate in crusts on the sides of the vats or fall to the bottom. Much still remains in the solution, however, after it is cold. To obtain out going to the expense of concentration, the brine is used in down the next lot of pressed lees or pomace. In this way tartaric acid is saved, and works out in the next run. The cryst thus goes on, and after the last distillation the liquor is boiled do suitable copper kettle until a scum of crystals begins to form o the water. The boiled fluid then goes to the tub, to let the crystallize out, and so on until the mother liquor is all used up.

The lees can then be pressed and used for fuel, gas, or making fort black.

In case the brandy is not distilled from pomace or lees bef above process is employed, it is necessary to boil with one and o times as much water for one and one half hours, so as to set f tartrates. If dried lees are used, four times as much water wi to be added.

The quantity of tartaric acid in lees is always variable, but ages from 6 to 8 kilogrammes (13.2 to 17.6 pounds) from 100 kilog (220 pounds) of liquid lees; whereas, from compressed lees full 25 per cent of acid can be obtained.

To extract all the acid from lees it will have to be obtained form of lime salts. If operations are to be conducted on a lar the following is the process:

After having distilled out the brandy, 2,500 kilogrammes (5,500 p are placed in a large vat lined with lead and holding about 150 hec (3,920 gallons). Add to this 50 kilogrammes (110 pounds) of r taric acid, and fill the vat with water nearly to the top. The vat arrangement for stirring, and the contents are boiled with stea contents are permitted to stand a few hours, when the clear li drawn off, and what remains behind is pressed out. Now mix cha the solution thus obtained, until no more free acid is present. T contained in the chalk combines with all acids present, and fall bottom. This forms crude lime salts of the tartaric acid, whi subsequently be worked into tartaric acid and other products.

The operation is substantially the same when conducted on a scale.

PRODUCTION OF FRANKFORT BLACK.

Lees which has reached this stage of working, and which h the alcohol and tartaric acid taken out, is now, like the pomace able either for gas making or for making Frankfort black. Th ratus for making either of these is the same as described previo making gas and Frankfort black from pomace.

LEES WINE.

Fresh lees may be used the same as pomace for making a cheap age resembling wine. This is done by adding the lees to a solu water and sugar, and in many countries of Europe this is done. are many modes of working recommended. According to Ness best way is to take from 10 to 15 litres of lees to every hectolitr

ns) of sugar water. This is made as strong as desired, according alcoholic content wanted in the wine. The wine in any event e poor, and if possible spirit might be substituted for the sugar. in and acid will also have to be added to make up any deficiency, 00 grammes of acid and 10 to 15 grammes of tannin for every litre. Whatever was said in the chapter about piquette—about se of sugar—applies equally here. The manner of handling the is the same as the wine from grapes. Lees is even used a second

other method is to dissolve 20 kilogrammes (44 pounds) of pure sugar and 5.5 kilogrammes (12 pounds) of cane sugar in 1 hectolitre gallons) of soft water; then add the sediment of 1 hectolitre of and let the whole ferment in a warm room. The vat is then filled ith a decoction of 6½ kilogrammes (14 pounds) of large raisins, ed in 7 litres of water. After eleven weeks you will draw off the wine, and in a year it will be found to have a very pleasant

OTHER METHODS OF USING LEES.

has already been mentioned that gas and black can be made from lees. If this cannot be done the lees can be pressed into cakes sed as fuel, the same as pomace.

ashes from these can be used the same as for preparing potash. over, the spent lees contains a large percentage of protein subes, and for this reason is excellent fodder. Lees is also as good as ce for a fertilizer.

CHAPTER V.

LIZATION OF RAW TARTAR—CHEMICAL COMPOSITION OF RAW TARTAR.

er the sugar the tartaric acid is the most valuable component of s. In the grapes it is generally in composition as potash or lime It has been mentioned before in this work how these salts can be ced, either from pomace or lees, and how the raw tartar is obtained. se salts are soluble in any solution containing alcohol, but it will und that even during the first violent fermentation of the grape some of them will be precipitated. After the fermentation is over will be formed from the wine on the sides of the barrels or vessels ich the wine is. This is the common raw tartar. The crusts are s some salt of tartaric acid, usually potash or lime salts. There found some other sediment and some coloring matter.

ere are two kinds of raw tartar—the white and the red. The white lly a brownish gray, and the red is dirty reddish. The structure ner amorphous, or else the exterior is coated with crystalline lime ites. The composition (and hence the value) depends on the ry of production, etc. Some crude tartar will show only a trifle ne in composition; others, again, run over 50 per cent of lime salts. ct, tartar from the same country, and the same vineyard, may show great differences in this respect.

in estimating the value of tartar these two tartrates only are of

any great value, the other component parts, such as water of lization, sediment, clay, sand, oxide of iron, etc., have been disr

The principal countries producing tartar are France (especiall south), Austria, Hungary, southern Germany, Switzerland, etc. Austro-Hungary large quantities are sent to England and G France has a large home market to meet and exports little. also true of Switzerland.

Besides containing sediment, etc., tartar carries several other substances not enumerated above, such as wood splinters, (which comes from sulphuring the casks), and careless handli bring in clay and sand. If, however, the tartar contains over per cent of clay and sand, it may be taken for granted that th been added intentionally. Occasionally a grape stone or gra will be found, but this is only when the cellarman has been ve less. Tartar is easily spoiled, and therefore must be handled ca

ADULTERATIONS OF RAW TARTAR.

Considering the importance of raw tartar as a commercial arti its comparatively high price, it is not a matter of surprise that it adulterated.

The use of sand for this purpose is quite common. This can be by heating. Another adulteration is to mix it with the slat often seen in boilers. Once covered with tartar dust these resem much the natural, genuine article. The deception is detected b ing a little acid over the inspected sample. Very often dried and lees is worked in, and whether this occurred naturally or was sometimes difficult for the expert to decide. This adulteration diminishes the value of the tartar, but is a source of danger, in as if the tartar should by any accident be wet, the added s might start up a fermentation which would ruin the whole.

The agent must be constantly on his guard, and must insist goods shall be uniform, and guard against being imposed upon of selected crusts on the top of the package.

As a rule, in determining the value, the practice is to ascert quantity of the potash salts, and estimate accordingly. To good practical test, get an average sample, and pulverize. grammes of the material; place in a glass vessel and add about centimetres of water; boil. To the boiling solution two or thre of neutral litmus solution are added, and the solution at once tu A normal solution of soda (made of 31 grammes of soda to eve of water) is added, drop by drop, until the solution turns bl neutralize 2 grammes of pure tartrate of potash, 10.64 cubic cent of the normal soda solution will be required, and proportionate

Thus, for instance, if 7.9 cubic centimetres are used for neut the solution, the percentage of acid tartrate of potash in the sam be figured out this way: $10.64 : 100 :: 7.9 : (x)$. $(x)=74.26$.

The following table can be used instead of making these calcu

TABLE FOR TESTING TWO GRAMMES.

enti- Nor- ution la.	Percentage of Acid Tartrate of Potash.	Cubic Centimetres Normal Solution of Soda.	Percentage of Acid Tartrate of Potash.	Cubic Centimetres Normal Solution of Soda.	Percentage of Acid Tartrate of Potash.
	0.94	3.7	34.78	7.2	67.68
	1.88	3.8	35.72	7.3	68.62
	2.82	3.9	36.66	7.4	69.56
	3.76	4.0	37.60	7.5	70.50
	4.70	4.1	38.54	7.6	71.44
	5.64	4.2	39.48	7.7	72.38
	6.58	4.3	40.42	7.8	73.32
	7.52	4.4	41.36	7.9	74.26
	8.46	4.5	42.30	8.0	75.20
	9.40	4 6	43.24	8.1	76.14
	10.34	4.7	44.18	8.2	77.08
	11.28	4.8	45.12	8.3	78.02
	12.22	4 9	46.06	8.4	78.96
	13.16	5.0	47.00	8.5	79.90
	14.10	5.1	47.94	8.6	80.84
	15.04	5.2	48.88	8.7	81.78
	15.98	5.3	49.82	8.8	82.72
	16.92	5.4	50.76	8.9	83.66
	17.86	5.5	51.70	9.0	84.60
	18.80	5.6	52.64	9.1	85.54
	19.74	5.7	53.58	9.2	86.48
	20.68	5.8	54.52	9.3	87.42
	21.62	5.9	55.46	9.4	88.36
	22.56	6.0	56.40	9.5	89.30
	23.50	6.1	57.34	9.6	90.24
	24.44	6.2	58.28	9.7	91.18
	25.38	6.3	59.22	9.8	92.12
	26.32	6.4	60.16	9.9	93.06
	27.26	6.5	61.10	10.0	94.00
	28.20	6.6	62.04	10.1	94.94
	29.14	6.7	62.98	10.2	95.88
	30.08	6.8	63.92	10.3	96.82
	31.02	6.9	64.86	10.4	97.76
	31.96	7.0	65.80	10.5	98.70
	32.90	7.1	66.74	10.6	99.64
	33.84				

er having found the number of cubic centimetres of normal solu- necessary to neutralize the sample under test, the corresponding ity of acid potassium tartrate in the sample can be found in the Sometimes in chemical analyses the total percentage of potash tartar is first determined, and then that present in the acid tar- s found. This method is not, however, entirely reliable.

normal solution of barytes can also be used instead of soda in g the determination. One litre must contain 76.5 grammes of s, and 10.64 cubic centimetres will neutralize 2 grammes of the artrate of potash. The above table can consequently be used also. other methods of determining the value of the tartar are, as a ltogether too complicated to be used readily.

determine the quantity of lime tartrate 100 grammes of the sam- raised to a red heat. The tartrate of potash turns to the carbonate, e tartrate of lime to the carbonate as well. The potash can be d out thoroughly, and the carbonate of lime is determined by the methods.

CTION OF TARTARIC ACID FROM RAW TARTAR AND TARTRATE OF LIME.

s best in handling raw tartar to change it first to tartrate of lime, ich shape it is most easily worked. The process is in brief to dis- the tartar in boiling water and mix the solution with carbonate of

lime. The acid tartrate of potash is by this means changed int neutral tartrate, and the excess goes into combination with the The neutral tartrate remains in solution. By adding sulphate of it is changed to sulphate of potash, with the formation of tartra lime.

By the use of sulphuric acid all the tartrate of lime made in ways is turned into sulphate of lime and tartaric acid, the sulpha lime precipitating. The tartaric acid can then be crystallized out.

By this process one hundred parts of acid potassium tartrate pro seventy-nine parts of tartaric acid.

The production of tartaric acid commercially, on a large scale, is as follows: The raw tartar, of any kind, is sifted and all foreign par removed as far as may be. The sifted tartar is then ground, plac a vat, and ten times the quantity of water poured over it; that i every 100 kilogrammes (220 pounds) of tartar 1,000 kilogrammes (pounds) of water are added. The vat is made of wood, but is lined lead, and a stirrer, also covered with lead, is provided. The stirr arranged to work by steam. The water is then boiled, and once bo carbonate of lime is added, little by little. This can be well-gr marble or chalk, or even limestone. After having added the nece quantity, boil for an hour, but keep constantly stirring. Then tes fluid for acid by means of litmus paper. Warm carbonate of lime be added until the mixture does not show an acid reaction; that is, all the acid is neutralized.

Care must be taken that too much carbonate of lime is not used. surplus would stay mixed in the tartrate of lime, and would neces the use of more sulphuric acid in the last operation to remove it. would be a dead loss.

The neutral tartrate is in solution, and is then changed to the tar of lime by adding the sulphate of lime (gypsum). Then boil se hours, still stirring the water. The sulphate of potash which is formed, remains in solution and the tartrate of lime is easily sepa

The production of tartaric acid from the tartrate of lime now c next. It is done by adding sulphuric acid. Care must be taken n use too little acid. If too little is used, it is very difficult to cryst out the tartaric acid in the presence of the tartrate, if, indeed it i altogether impossible. To add too much is not advisable, as the cry of tartaric acid would be liable to be browned. Experience is the way by which the matter can be learned.

The quantity of sulphuric acid necessary to be added can be tol a chemical calculation the moment that the quantity of acid tar of potash is determined by the first test. Or it can be estimated b quantity of carbonate of lime which had to be added to the soluti neutralize it. The ratio is usually about forty-nine parts of sulp acid to fifty parts of lime used, but this will always be found a too high for the acid, as the lime will always carry moisture.

Before using in this work, concentrated sulphuric acid must be di with six times as much water. The best method to estimate the stre of sulphuric acid is by its specific gravity.

The following table shows the strength of sulphuric acid at 15. (60° F.):

Percentage of Sulphuric Acid.	Specific Gravity.	Percentage of Sulphuric Acid.	Specific Gravity.	Percentage of Sulphuric Acid.
100	1.7570	84	1.5760	68
99	1.7465	83	1.5648	67
98	1.7360	82	1.5503	66
97	1.7245	81	1.5390	65
96	1.7120	80	1.5280	64
95	1.6993	79	1.5170	63
94	1.6870	78	1.5066	62
93	1,6750	77	1.4960	61
92	1.6630	76	1.4860	60
91	1.6520	75	1.4760	59
90	1.6415	74	1.4660	58
89	1.6311	73	1.4560	57
88	1.6204	72	1.4460	56
87	1.6090	71	1.4360	55
86	1.5975	70	1.4265	54
85	1.5868	69	1.4170	53

ıpproximation can be obtained by means of an acidometer. Ac-
g to Beaume's acidometer the following table prevails:

Specific Gravity.		Specific Gravity.
1.84	45°	1.44
1.77	40°	1.38
1.70	35°	1.31
1.65	30°	1.26
1.52	25°	1.21

treatment of the tartrate of lime must be done in lead-lined tubs,
ent action by the sulphuric acid on the tubs.
r having poured the requisite quantity of diluted sulphuric acid
tartrate of lime, the stirrer is started up and the mixture is boiled
hour. Then the chemical reaction needed should be finished.
n the contents of the tub have settled and cooled the liquor is
l. The frames of the filter had best be covered with lead, and a
iltering cloth is stretched over them. The dissolved tartaric acid
asses through the filter while the precipitated sulphate of lime is
by the filter. The tartaric acid solution runs from the filter
y to the concentrating pans. These are flat wooden boxes lined
ead, and should stand in close proximity to the filtering apparatus,
little distance below it. The concentrating pans each have a coil
pipe through which steam is made to pass, and which heats the
n up to 100° C. (212° F.). This temperature does not affect the
c acid, but causes the water to evaporate very rapidly. As soon
surface of the liquor begins to show crystals the steam is shut
l the solution permitted to rest for an hour.
washing of the sulphate of lime is done several times to get all
taric acid possible. The precipitated sulphate of lime can also
l earlier in the process instead of fresh gypsum.
n the tartaric acid solution is perfectly clear, it is racked off and
to crystallizing cylinders, which are made of lead and are about 1
high (39 inches) and 60 centimetres (19 inches) in diameter.
oling is done slowly, so as to assist the formation of large tar-
cid crystals. The cylinders might be wrapped around with some
nductor of heat, such as wool or straw, and covered with a tightly
lid to prevent too rapid cooling. It will take from four to eight
complete the crystallization, when the mother water is run off.

If care has been taken, the crystals will, at first, be as white a
They should be lightly washed and are then ready for the mark
The mother liquor which is drawn from the crystals is boiled
It gradually assumes a dark color, due to the growing concentra
the sulphuric acid contained, and to the influence of the acid
organic ingredients which may be contained. To use up the
liquor, it is diluted with water and neutralized, as before describe
chalk. The tartrate of lime obtained in this way must be wor
as previously described. The tartaric acid crystals obtained fr
mother liquor are always darker than those from the first r
should be re-crystallized several times to clean them. The de
ing may be facilitated by passing the acid solution through bo
which, however, must be free from lime, and be boiled several
It can be filtered in a linen filter, on a lead frame, and the cryst
be perfectly colorless.

Fig. 21.

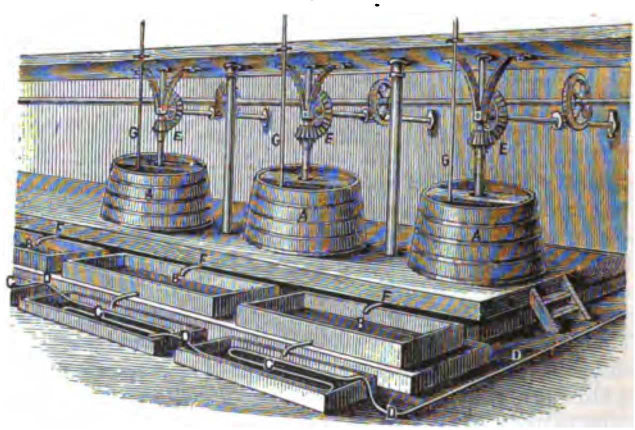


Fig. 21 shows the arrangement of a large tartaric acid facto
the most needful apparatus. *A*, *A*, *A* are the dissolving tubs;
the filters; *C*, *C*, *C* the concentrators, each with the lead stea
D, *D*, *D*; *E*, *E*, *E* are the cogs running the stirring apparatu
pipes, *F*, *F*, *F*, convey the liquor from the tubs to the filters, and
G, *G*, *G* steam is introduced into the tubs. All those parts of th
ratus which come in contact with the sulphuric acid *must* be sl
with lead, as this is one of the few metals which this acid cannot
Stoneware vats can be used in some few instances.

The size and number of the vats depend altogether on the s
which operations are to be conducted. It will not pay to run
tory at spasmodic intervals, if it is contemplated to produce t
from the tartrate of lime previously obtained from pomace a
It is not absolutely necessary to use gypsum (sulphate of lime)
process of producing tartrate of lime from the raw tartar.
quicklime can be used, or chalk or chloride of lime will do in ap
ate quantities.

Pure tartaric acid forms good, large crystals, as clear as water,
smell, and of a pleasant acid taste. The specific gravity is 1.7

n be dissolved in 1.8 parts of cold water. It is also soluble in hol, but not in ether. If it becomes moist on standing, it is safe to hat it carries sulphuric acid or chloride of lime. If it carries tar- or sulphate of lime, it does not give a clear solution with alcohol. contains lime, an acid oxalate of lime will separate out if mixed a solution of oxalate of ammonia. If sulphuric acid, or any sul- es are present, a solution in water will give a heavy precipitate if d with barium chloride or any of the soluble barium salts. This pitate is absolutely insoluble in acids. It should also be tested for c acid.

rious metals may be found in the acid, such as lead, copper, and Lead is particularly liable to be present, from the use of leaden gs to the tubs, etc. Sulphuretted hydrogen will produce a black pitate in a solution of the acid, if black precipitate of either lead pper is present; or a yellowish precipitate if zinc is there alone.

PRODUCTION OF CREAM OF TARTAR.

rtaric acid, and especially the acid tartrate of potash, has a wide of use in medicine, in the arts, and in manufactures. Another rtant chemical compound of tartaric acid and two bases is tartar ic, the double tartrate of potash and antimony.

t by all means the most important is the cream of tartar, and to uce it directly from the argols, they may be leached with ten times weight in water, in wooden tubs, and boil. The tubs are then left e contents to settle. The acid tartrate of potash (cream of tartar) out all dissolved, while the tartrate of lime remains. Formerly no tion was paid to these lime residues thus remaining, but now it is l that if worked up in the regular factories they will about pay all nses.

e clear solution is racked off from the insoluble residue. It carries y little tartrate of lime. It is boiled and crystallized out as ibed before, and the crystals are washed and dried. The acid tar- obtained in this manner still contains some coloring matter and a lime tartrate, and is called half refined tartar. To purify it it is l with hot water, and the color removed by adding 5 per cent of eight of the tartar of bone-ash containing no lime. The first crys- nd crusts will be found perfectly pure.

eam of tartar forms white, hard crystals of a slightly acid taste. It rfectly insoluble in alcohol, but is dissolved readily in alkaline ions.

e neutral tartrate of potash is also a well-known commercial sub- e, obtained best by neutralizing the acid tartrate (cream of tartar) carbonate of potash. To effect this 36.7 parts of the carbonate ld be taken to every 100 parts of the acid tartrate.

e carbonate of potash is first dissolved in water, and then the solu- is neutralized by adding the acid tartrate, the operation ending foaming ceases. The solution should be made a trifle acid with cid tartrate, and finally neutralized with carbonate of potash. If ary cream of tartar is used, there will be some tartrate of lime nt, which, however, will settle out in the course of three or four s. The solution of neutral tartrate is then poured off and crystal- . These crystals are pure enough for medicinal purposes. The salt,

when pure, appears in brilliant rhomboidal crystals. It has no s
a salty taste, and has a specific gravity of 1.96.

Another important salt is the double tartrate of soda and pota
Rochelle salts. This salt was first produced in 1672, but the me
was guarded as a secret until 1731, when the process of neutralizi
solution of cream of tartar with soda was discovered. To effect this
parts of the anhydrous carbonate, or 76.1 of hydrous carbonate
crystallized), will be required for every 100 parts of cream of ta
The soda is dissolved in hot water (3 parts to 20), and the soluti
neutralized with cream of tartar. The tartrate of lime, if any is
ent, will settle out in a few days, and the liquor is filtered; and cry
lization is brought about as heretofore described.

Pure tartrate of soda is made from tartrate of lime in the same
ner as tartrate of potash is made, using sodium carbonate inste
potassium carbonate in the processes previously described.

Rochelle salts (double tartrate of soda and potash) crystalliz
large columnar crystals as clear as water, has no smell, has a
salty taste, and a specific gravity of 1.78. It dissolves in 2.5 pa
cold and less than one part of boiling water, and is only slightly
ble in alcohol. A solution in water has a neutral reaction. If b
too much a change will occur in the salt, and nothing will be lef
carbonate of soda and potash.

Another important salt is the double tartrate of antimony
potash, commonly called tartar emetic, first produced in 1631.
usually manufactured by boiling a solution of cream of tartar wit
oxide of antimony. The solution is quickly filtered and heated
steam until it crystallizes. After a few days the crystals are plac
a filter, washed with water and dried. The mother liquor which ren
may contain the tartrate of antimony, which can be crystallize
afterward. If the cream of tartar used in making tartar emetic con
any lime, it is best to add a little carbonate of potash to the stil
solution, whereby the lime is precipitated as carbonate of lime b
filtering.

It is necessary, in the production of tartar emetic, to know the
quantity of materials to be used. This can only be obtained by fig
from the chemical reaction. If too little oxide of antimony is use
tartar emetic will still contain some cream of tartar; and if too
is used, part of it will remain undissolved.

Tartar emetic forms rhomboidal crystals, as clear as water, whicl
in the air their water of crystallization, and become friable and
tegrate. Taken in small quantities, this salt produces violent vom
and in large quantities it is poisonous. It should not give off a g
like smell if heated on an iron spoon; if it does, the antimony con
some arsenic. A solution in water should not get muddy on the
tion of the oxalate of ammonia; if it does, it contains lime. If the
tion gives a precipitate with chloride of barium, it contains sulp
acid or sulphates.

Another important salt is the tartrate of iron and potash, ma
mixing six parts of pulverized cream of tartar and one part of iron f
with sufficient water to make a thin paste. The water is renewed
evaporates. After two or three weeks the paste is greenish blacl
is then dried.

Tartrate of iron and potash is a grayish or greenish-black p

h comes from the process in the form of black globules. It tastes and sweet; has no smell; becomes moist in the atmosphere with- lissolving, but can be readily dissolved in water. It is used in cine. Another, but less important salt, is the tartrate of ammonia potash. Another is the tartrate and borate of potash.

RTANCE OF TARTARIC ACID AND ITS SALTS IN MEDICINE AND COMMERCE.

rtaric acid and its many salts are used in large quantities in the strial arts and in chemistry. It has been a long time since the nd was met by the natural formation of the tartar in wine barrels, year by year the increase is so great that there is an imperative nd for the use of all available pomace and lees. In many indus- tartaric acid and the tartrates are absolutely necessary, and cannot placed by anything else.

rtaric acid itself is largely used in medicine, in making effervescing ers and beverages, in making lemonade, and in great quantities in dyeing establishments and cloth weaving. In Europe, for making cial wines, it has a large demand.

tural cream of tartar, of course, is the main source of tartaric acid. s formerly used for making chemically pure carbonate of potash. widely used in medicine, and in the chemical works it has many l applications. In the arts it is used during the process of bleach- arnished silver articles and during the process of tinning brass. nerica it has an immense application in the manufacture of the led baking powders, which replace in many instances the use of

e neutral tartrate of potash is also used in medicines. As early as Liebig recommended its use for reducing the free acid in wine, and very extensively used in France for that purpose.

chelle salts, another tartrate, finds its principal use in medicine, mildly aperient, and forming the main ingredient of the well- n seidlitz powders.

rtar emetic, tartrate of iron and potash, and the tartrate of potash mmonia, also have a wide use in medicine.

APPENDIX D.

TEMENT OF THE IMPORT DUTIES OF ALL THE PRINCIPAL COUNTRIES TO WHICH CALIFORNIA WINES, BRANDIES, AND RAISINS ARE OR MAY BE EXPORTED.

Prepared by WINFIELD SCOTT, Secretary of the Commission.

STATEMENT OF THE IMPORT DUTIES

LL THE PRINCIPAL COUNTRIES TO WHICH CALIFORNIA WINES, BRANDIES, AND RAISINS ARE OR MAY BE EXPORTED.

Prepared by WINFIELD SCOTT, Secretary of the Commission.

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nands are frequently made at the office of the Board of State
ıltural Commissioners for a reliable statement of the tariffs of the
pal foreign countries to which the viticultural products of Cali-
are at present, or may be in the future, exported, whether from
'rancisco or from Atlantic ports. These statistics have been col-
from the Consuls of the various countries, resident in San Francisco,
re therefore official and correct.

WINFIELD SCOTT,
Secretary.

ENGLAND AND HER COLONIES.

ENGLAND.

n casks, not over 30° proof	1 shilling per gallon.
n casks, between 30° and 42° proof	2 shillings 6 pence per gallon.
parkling, under 30° proof	1 shilling per gallon.
parkling, between 30° and 42° proof	2 shillings 6 pence per gallon.
ies over 42° proof	3 pence additional for each degree.
ling and in bottles, if not worth over 15 shillings	1 shilling per gallon additional.
15 shillings	2 shillings 6 pence per gallon additional.
	10 shillings 10 pence per proof gallon.
not tested, as in cordials	14 shillings 8 pence per gallon.
if bottled and in bond	3 pence per dozen.
ed spirits	17 shillings 3 pence per gallon.
	7 shillings per hundredweight.

.—Grape brandy from countries other than France cannot be entered as cognac.

CANADA.

ıp to 26 per cent alcohol	25 cents per gallon and 30 per cent ad valorem.
ach degree between 26 and 40 per cent	3 cents per gallon.
parkling	$3 per dozen and 30 per cent ad valorem.
	$2 12 per imperial gallon.

NEWFOUNDLAND.

	51 cents per gallon.
ı reds and Italian	35 cents per gallon.
	35 cents per gallon.
d Madeira	$1 65 per gallon.
nd Burgundy	$1 per gallon.
agne	$3 per gallon.
er	15 per cent and 90 cents per gallon.
	15 per cent and $2 40 per gallon.

QUEENSLAND.

parkling	10 shillings per gallon.
ll other	6 shillings per gallon.
	14 shillings per gallon.
coloring, having over 35 per cent alcohol	12 shillings per gallon.
	2 pence per pound.

TASMANIA.

Wine, sparkling	10 shillings per
Wine, all other, in wood	6 shillings per
Wine, all other, in bottles	8 shillings per
Brandy	15 shillings per
Brandy coloring, over 35 per cent alcohol	15 shillings per

NEW ZEALAND.

Wine, sparkling	13 shillings per
Wine, all other, except Australian, containing less than 40 per cent proof spirits.	6 shillings per
Wine, Australian, containing not more than 35 per cent proof spirits	5 shillings per
Spirits in bottles, jars, etc.	14 shillings per
Spirits in bulk, jars, etc.	15 shillings per
Raisins and dried fruit	2 pence per

NOTE.—There is a discrimination of 1 shilling per gallon in favor of Australia

NEW SOUTH WALES.

Wine, sparkling	10 shillings per
Wine, all other	5 shillings per
Brandy	14 shillings per
Brandy coloring, containing over 35 per cent alcohol	14 shillings per
Raisins	2 pence per

VICTORIA.

Wine, sparkling	8 shillings per
Wine, all other	6 shillings per
Brandy	12 shillings per
Brandy coloring, containing over 35 per cent alcohol	15 shillings per
Raisins	2 pence per

SOUTH AUSTRALIA.

Wine, sparkling	10 shillings per
Wine, all other, up to 35 per cent proof	6 shillings per
Brandy	14 shillings per
Brandy coloring, containing over 35 per cent alcohol	14 shillings per
Raisins	2 pence per

CEYLON.

Claret, bottled	1 rupee and 25 cents per
Claret, bulk	50 cents per
Sparkling wines	50 cents per
All other wines, bottled	1 rupee and 50 cents per
All other wines, bulk	1 rupee per
Spirits	4 rupees per proof gallon, and 50 cents for every 10° ove

FIJI ISLANDS.

Claret and Australian wines, bottled or bulk	2 shillings per
All other still wines	4 shillings per
Sparkling wines	6 shillings per
All spirits	14 shillings per

NEW GUINEA.

Spirits	12 shillings per
Sparkling wines	6 shillings per
Other wines	4 shillings per

JAMAICA.

All wines	2 shillings 6 pence per
All spirits	10 shillings per

TRINIDAD.

Wines, sparkling	4 shillings per
Wines, all other, bottled, under 35 per cent alcohol	2 shillings 6 pence per
For each degree over 35 per cent	3
Wines, all other, in wood, up to 22 per cent	8 pence per
Wines, all other, in wood, up to 32 per cent	1 shilling per
Wines, all other, in wood, up to 42 per cent	2 shillings 6 pence per
For each degree above 42 per cent	3
Brandy	9 shillings per

BERMUDA.

............20 per cent ad valorem.
and all distilled liquors............4 shillings per gallon.

BRITISH GUIANA.

ot over 26 per cent proof and not over $2 per gallon ....50 cents per gallon.
ottled............$1 per dozen pints.
l other............80 cents per gallon.
tuous liquors............$2 50 per proof gallon.

CAPE COLONY.

............6 pence per imperial gallon.

OTHER COUNTRIES.

FRANCE.

and distilled liquors of all kinds............30 francs per hectolitre.
s............30 francs per hectolitre.
om countries not in commercial union with France............
............1 franc and 50 centimes per hectolitre for each
ee of alcohol up to 11°; and for each degree above 11°, 2 francs and 65 centimes.
om countries in commercial union with France or with a special treaty....
............70 centimes per hectolitre per
ee of alcohol up to 11°; and 2 francs and 65 centimes for each degree above 11°.
m duty: 1 franc 20 centimes per degree up to 11°, and 1 franc 65 centimes for
degree above 11°, alcohol.
m duty: 70 centimes per degree up to 11°, and 1 franc 65 centimes for each
ee above 11°, alcohol.

GERMANY.

casks, leather bottles, or jugs of at least 50 kilogrammes gross weight......
............24 marks per 100 kilogrammes.
small bottles or small leather bottles or jugs............
sparkling, 80 marks per 100 kilogrammes; if still, 48 marks per 100 kilogrammes.
vines and cider not included.
apes............24 marks per 100 kilogrammes.
ed grapes............Same as wine.
andies............180 marks per 100 kilogrammes.
d singlings............Free.

GERMANY, WITH COUNTRIES IN ZOLLVEREIN.

e and must in casks for blending purposes........10 marks per 100 kilogrammes.
ines............20 marks per 100 kilogrammes.
r distilling............10 marks per 100 kilogrammes.

ITALY.

casks............20 francs per hectolitre.
bottles............60 francs per 100 bottles holding not over 1 litre.

RUSSIA.

rum, brandy (French), and prune brandy in casks......12 rubles per pud, brutto.
irits in bottles, liquors, kirchwasser, gin, whisky, and all spirits flavored with
ous fruits, also arrack, rum, French brandy, and prune brandy..1 ruble per bottle.
grapes—
ported in wood............4 rubles per pud, brutto.
ousseux............45 copecs per bottle.
nds mousseux............1 ruble 40 copecs per bottle.
s............1 ruble 80 copecs per pud.
ks.—If wines are above 16° alcohol they are subject to additional duty of 12 copecs
ee above 16°.
ud is equivalent to 32 pounds.
ties payable in gold.

SPAIN.

parkling............150 pesetas per hectolitre.
ll other............50 pesetas per hectolitre.
............20 pesetas per hectolitre.
istilled liquors............1 peseta per litre.
erved and dried fruits............1 peseta per kilogramme.

DENMARK.

Wine and fruit juice, unfortified, in bottles .... 13.44 cents
Same in barrels .... 2.73 cents pe
Grape wine, in casks .... 22 per cent ad
Grape wine in stone jars .... 45 per cent ad
Liquors which cannot be graded .... 13.44 cents
Same, 8° strength or under .... 50.4 cents per ei
Same, for each ¼ degree over 8° .... 1 cent per ei

SWEDEN.

Wines, all kinds, not exceeding 21 per cent of alcohol .... 15 ore
Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in casks) .... 30 ore per kilo
Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in other packag .... 65 ore
Wines, all kinds, over 25 per cent of alcohol .... 1 krone 50 ore
Brandy and spirits in casks and made from grapes in any other country than Fr .... 75 ore per litre of 50 per cent alcohol
Same in other packages (regardless of the percentage of alcohol) .... 1 krone 11 ore per kilo
Raisins .... 14 ore per kilo
No allowance for tare.

NORWAY.

Wines, not exceeding 21 per cent alcohol, in casks (16 per cent for tare) .... 11¼ ore per kilo
Wines, not exceeding 21 per cent alcohol, in bottles .... 11¼ ore
Wines, between 21 per cent and 25 per cent alcohol, in casks (16 per cent for tar .... 36 ore per kilo
Wines, between 21 per cent and 25 per cent alcohol, in bottles .... 36 ore
Wines, over 25 per cent alcohol .... Same as brandy 1
Brandy, in bottles .... 1 krone 60 ore
Brandy, in other packages, 100 proof (16 per cent tare for casks) .. 1 krone 71 ore
Raisins (20 per cent tare on cases) .... 12 ore per kilo

BELGIUM.

Alcoholic liquors (distilled) used as beverage, up to 50° strength; Gay Lussac a C., in casks .... 100 francs per h
Same, each degree in excess of 50° .... 2 francs per h
Same, in bottles, regardless of strength .... 200 francs per h
Wines (subject to Internal Revenue tax of 23 francs per hectolitre) ....
Wines, over 18 per cent alcohol .... Excess at the rate for alcoholic
Raisins .... 25 francs per 100 kilog

SWITZERLAND.

Dried raisins for wine making .... 20 francs per 100 kilog
(N. B.—Dried raisins for wine making pay, besides the duties, an internal t fixed later.)

Juice from fruit or berries, evaporated fruit juice, without sugar, with or wit alcohol .... 20 francs per 100 kilog
(N. B.—Subject also to an internal tax, to be fixed later.)

Wine in casks—natural .... 3.50 francs per 100 kilog
Wine in casks—artificial .... 7 francs per 100 kilog
Wine in bottles—natural .... 25 francs per 100 kilog
Wine in bottles—artificial .... 50 francs per 100 kilog
(N. B.—Artificial wines pay double the duty of natural wines. The natur containing over 13° of alcohol, and the artificial wines containing over 12° of pay for each degree above an internal tax of 80 centimes and a supplemental d centimes per 100 kilogrammes. Natural wines are considered the products of mentation of fresh grapes, without any other admixture.)

Sparkling wines, in bottles .... 40 francs per 100 kilog
Spirits of wine and alcohol, in casks per centesimal degree of pure alcohol meas with the alcoholometer of Tralles ...... 20 francs per degree and per 100 kilog
Brandy and other alcoholic drinks, such as cognac, rum, arrack, etc., which are liquors in the ordinary sense, that is, which contain neither aromatics sugar:
In casks, per degree of pure alcohol measured with the alcoholometer of Tr .... 20 francs per degree and per 100 kilog
In bottles or jars, without regard to alcoholic measures .... 30 francs per 100 kilog

*4.7 pots equal 1 gallon.

TURKEY.

nd brandies	8 per cent ad valorem.

HAWAII.

and other spirits	$10 per gallon.
for medicinal uses	$3 per gallon.
etc. (between 30 and 55 per cent of alcohol and above 55 per cent pro rata).	$3 per gallon.
gne	$6 per dozen quarts.
g Moselle and Hock	$4 per dozen quarts.
ry, quarts	40 cents per dozen.
ry, pints	40 cents per two dozen.
ry, in bulk	15 cents per gallon.
ortified, between 21 and 30 per cent alcohol	$2 per gallon.

MEXICO.

d or white, in glass, no allowance for leakage or breakage	20 cents per kilogramme (net weight).
wood	10 cents per kilogramme (net weight).
r spirituous liquors under same conditions	25 cents per kilogramme (net weight).
	10 cents per kilogramme (net weight).

SALVADOR.

iquors	5 cents per kilogramme (gross).
liquors	30 cents per kilogramme (gross).
	10 cents per kilogramme (gross).

NICARAGUA.

es	3 cents per pound (gross).
g wines	5 cents per pound (gross).
liquors (between 12° and 25° alcohol)	40 cents per pound (gross).
y degree above 25	3 cents per pound (gross).

A reciprocity treaty with the United States is being concluded.

COSTA RICA.

hite wines in bottles	3 cents per kilogramme (gross).
hite wines in bulk	5 cents per kilogramme (gross).
wines in bottles	9 cents per kilogramme (gross).
wines in bulk	13 cents per kilogramme (gross).
(whose introduction is allowed in barrels)	80 cents per kilogramme (gross).
(introduced in other packages)	60 cents per kilogramme (gross).
nd all brandies (in barrels or demijohns)	80 cents per kilogramme (gross).
nd all brandies (in other packages)	60 cents per kilogramme (gross).
l fruits, including raisins	13 cents per kilogramme (gross).

GUATEMALA.

es (in whatever packages)	25 cents per bottle.
ines (in whatever packages)	28 cents per bottle.
n whatever packages)	28 cents per bottle.
rs	35 cents per bottle.
and all spirits up to 20° Baumé	63 cents per bottle.
l fruits	7 cents per pound.

HONDURAS.

n cask or bottle	2 centavos per pound.
, in cask or bottle	30 centavos per pound.
l fruits	8 centavos per pound.

ECUADOR.

	10 centavos per kilogramme (gross).
	Cane brandy prohibited.
andy	25 centavos per kilogramme (gross).
	5 centavos per kilogramme (gross).

COLOMBIA.

n barrels or demijohns	2½ cents per kilogramme.
vine, in barrels or demijohns	5 cents per kilogramme.
r wine	40 cents per kilogramme.
and distilled liquors	40 cents per kilogramme.
	20 cents per kilogramme.

CHILE.

Red wines, in bottles	$2 25 per dozen.
Red wines, in wood	25 cents per litre.
White wines, in bottles	$3 per dozen.
White wines, in wood	22 cents per litre.
Wine spirits	50 cents per litre.
Cognac	$4 per dozen.
Cognac, in wood	42 cents per litre.

VENEZUELA.

Wines for medicinal purposes	1.25 bolivares* per kilogramme.
Bordeaux and Spanish reds	.25 bolivares per kilogramme.
All others	.75 bolivares per kilogramme.
Sweet liquors (not rectified)	1.25 bolivares per kilogramme.

CHINA.

Wines and brandies	Free.

* One bolivar equals 19.3 cents.

APPENDIX E.

WINE.

SIFICATION—WINE TASTING—QUALITIES AND DEFECTS.

OF. G. GRAZZI-SONCINI, Director of the Royal School of Viticulture,
Alba, Italy.

ated by F. T. BIOLETTI, of the Agricultural Experiment Station
cultural Section), University of California, Berkeley, California.

KELEY, September 1, 1892.

AUTHOR'S PREFACE.

ROYAL SCHOOL OF VITICULTURE AND ŒNOLOGY,
ALBA, PIEDMONT, ITALY, January, 1892.

preface should give an immediate idea of what the author has pro- to do in writing his book. As Balbo rightly says in the preface e of his books:

is the duty of every writer to give the reader a terse and clear idea e work which he presents him. This sincerity benefits both: the r, because it puts him in the position of knowing whether or not ook is likely to be of interest or utility to him; the writer, because, t it may reduce the number of his readers, it insures him more ested, attentive, and indulgent ones.

he clearest and most sincere way of giving an explication of the t of a book is to tell how it was written."

us I will explain, as well as possible in a few words, why I have en this book, which treats especially of the classification, the qual- and the defects of wine.

hen I commenced to give particular attention to viticulture and ogy, I soon perceived that in œnology, and especially in that part n regards classification, qualities, and defects, all authors were not cord in their use of terms to express the same characters. Thus, for ple, some would mean by "sève," a slight sweetness in the wine; s by the same term would intend to express that character by n a wine of good quality affects the mouth and olfactory organs a certain perfume, for a longer or shorter time after it has been owed.

vill say nothing of the classification of wines according to dishes, ne to be drunk with oysters, fish, roast meat, etc., which shows a ed tendency to become a veritable chaos. In this classification, ork of Mr. Bertall, "La Vigne-Voyage Autour des Vins de France," ken too literally.

w could one speak of the classification of wine, of its qualities, of efects, without giving some explanation of the mode and proper tions for tasting? It is for this reason that I have devoted a ter to the tasting of wine, a chapter, moreover, of great importance, is by tasting, more than by chemical analysis, that we can best e of the constitution and future of a wine. Who is a better judge than xperienced taster of the bad flavor produced in wine, for instance, e tartaric fermentation, which even in its incipiency he can detect certain burnt taste, which, with the progress of the malady, grad- develops into an insupportable bitterness? Among these gradations tterness we do not find that slight bitterness peculiar to certain s, such as Barolo and Gattinara.

emical analysis gives us the principal components of wine, and the presence or absence of certain of these and from their propor- , some judgment may be formed of the character of the wine. The

taster alone is able to detect diseases at their incipiency, and, one might almost say, before they have commenced, whilst the chemist can only state the final consequence. In other words, one might say that whilst the chemist is limited to making a diagnosis, the taster can make a prognosis.

In the case of some defects of wine, I have not confined myself to a simple definition or description. I have also added notes, brief in some cases, more extended in others, on the determining causes and the means of prevention or cure. I have done this, believing it would be useful to the taster or the dealer, who is not always fully informed on all the details of technical œnology. With this information for a guide, he will be better able to judge of the relative gravity of this or that defect, and the dealer especially will be able to judge of the utility or inutility of attempting to cure a wine of a certain defect.

I have also tried—wishing to be useful to the greatest possible number of readers—not to neglect a secondary part, which has its importance in tending to make the consumer better appreciate the wine he drinks. Profiting by the *Consigli di un amatore di vini*, I have indicated the form of glass to be used with each kind of wine, how wines should be presented and distributed during the repast, and how they should be drunk. In this part, which I have called secondary, it is not to be denied that fashion is the determining factor.

And now the reader may judge if I have succeeded in my intentions. Even though his judgment should not be favorable, I shall consider myself fortunate in being the first—as far as I know—to call attention, in an extended manner, to this part of œnology, which in former treatises on the subject has been but lightly touched upon.

G. GRAZZI-SONCINI.

TRANSLATOR'S PREFACE.

GRICULTURAL EXPERIMENT STATION, UNIVERSITY OF CALIFORNIA,
BERKELEY, CAL., September 16, 1892.

fessor Grazzi-Soncini's book, which has been already translated 'rench, fills a void in the literature of œnology. The part dealing the defects of wine, the diseases to which it is subject, and the ɔds, when such exist, of remedying these diseases, will perhaps be of ıost practical value to the wine grower. The part which regards g and classification, however, is worthy of careful reading, and hints may be drawn from it that will be of use towards the attain- of that most desirable object: the production of constant types of —an object which is too little studied in California, but on which ɔpes of building up a trade in high-class wines very largely depends. ny of the numerous terms which the French and Italians have ted for the technical consideration of wine it is impossible or diffi- ɔ translate into English, and for this reason the translation neces- lacks some of the scientific precision and clearness of the original. e however attempted, wherever possible, to give the English equiv- of the term used by the author, and have also given the French in this way making a glossary in the three languages, which may ɔly be of use in developing a uniform set of technical terms on this ːt in our own language.

ːhis book should be of any use to the wine maker, and especially ːhould call the attention of non-wine-drinking people to some of ːes and beauties of wine which they did not suspect, the translator ːel amply repaid for his trouble.

F. T. BIOLETTI.

WINE AND THE ART OF WINE TASTING.

By G Grazzi-Soncini.

INTRODUCTION.

Wine is simply the juice or must of the grape after it has undergone the process of fermentation.* This may be considered as the most natural and exact definition that can be given of it. It is the definition accepted by the law.

On account of the prevalence of sophistications and the considerable amount of wine that is now made from dried grapes and other saccharine fruits, a more particularized definition of wine is now given; it may be formulated as follows:

By wine is understood that liquid which is obtained by the alcoholic fermentation of the juice or must of fresh grapes. This must may be fermented in contact or not with the pomace or solid portion of the grapes, without, however, the addition of any extraneous substance or even of substances chemically the same as those that the grapes them-

*Although as Gautier writes, "Wine is a very complex body, and so delicate that the work of chemists, so far, has been but an outline of what there is to do in the study of it," I think it will be useful, because it will give a more complete idea of the subject of our remarks, to give a list of the principal components of grapes, or must, and of wine:

A. Solid Bodies.

Stems: Lignose—Tannin—Albuminoids—Organic salts and acids—Mineral salts and acids—Chlorophyll—Gummy matters—Phosphates—Potash, lime, magnesia, silica.

Skins: Cellulose—Œnocyanin—Œnorubin—Tannin—Cream of Tartar—Catechin—Quercite (?)—Waxy matters, ferment germs—Etherous and aromatic principles—Nitrogenous substances—Phosphates—Potash, lime, magnesia, iron, silica.

Pulp: Cellular parenchyma—Nitrogenous substances—Cream of tartar—Gum, pectin, dextrin (?)—Gases, nitrogen, carbonic acid—Divers salts.

Seeds: Lignose—Fatty matters—Nitrogenous substances—Gum—Starch—Phosphates—Divers salts—Tannin.

B. Liquid Bodies.

Water—Glucose—Levulose—Divers nitrogenous substances—Saccharose, dulcite—Cream of tartar—Tartrate of calcium—Tartaric, malic, and racemic acids—Halogen acids (traces)—Ammoniacal salts and organic derivatives—Phosphates, sulphates, nitrates—Potash, lime, magnesia.

C. Gaseous Bodies.

Carbonic anhydride—Nitrogen—Hydrogen sulphide.

Elements of Wine (Red Wine).

Water—Alcohols: ethylic, propylic, butylic (amylic?), caproic, œnanthilic, caprylic, pelargonic, capric.

Higher alcohols—Glycerine—Isobutyl—Mannite—Glucose—Levulose—Inosin—Gum—Pectic matters—Essential oils—Furfurol—Aldehyde—Acetal.

Ethers: acetic, propionic, butyric, valerianic, caproic, lauric, myristic, palmitic, stearic.

Acids: carbonic, acetic, propionic, butyric, caproic, œnanthylic, caprylic, capric, lauric, myristic, tartaric, racemic, succinic, malic, tannic, sulphuric, nitric, phosphoric, silicic, chlorhydric, fluorhydric. These acids are either free or combined with the bases: potash, soda, lime, magnesia, alumina, iron oxide, manganese, ammonia, volatile bases of the pyridic series.

Albuminoids—Coloring matters.

s contain. The addition of the latter is considered by many as an eration, because it changes the quantitative composition of the , and consequently of the wine.

no first made wine is not known. The history of its manufacture, that of many other fermented beverages, extends back into the of ages; nothing, therefore, is known about its first use. Tradi- and mythology give several accounts of its first appearance, but are of a very contradictory nature.

one thing we may be sure, and that is that from the first, man has himself the question: Is wine a real benefit? A question that ot yet, perhaps, been answered to the satisfaction of some.

en at the present day it is not possible to give a satisfactory, defi- reply to this demand, unless we look at it from an economical stand- , in which case there can be no doubt of its utility, as it is one of rincipal sources of national wealth in every country where the can be grown.

must therefore consider it from this point of view, otherwise its tility to man might be contested.

s said that wine incites man to anger, licentiousness, murder, and neral subjects him to a thousand depraving temptations.

vino e il veleno piu teribile per la società. Nè i fulmine di Giove, spada di Marte, nè i baci di Venere hanno fatto tante vittime quanto coi calici spumante."—Bizzozero.

ohol, the moment it enters the cells and nervous filaments, revives functions and excites and stimulates their action; this state of ation passed, however, if more alcohol is imbibed by the cells and s a period of exhaustion supervenes. The presence of this foreign in the organism, tainting the blood and diffusing its vapors gh the substance of the brain, interferes with the chemical pro- of the body, augments the resistance to the nervous movements, ngenders that particular kind of poisoning known under the name oxication.

vas owing to wine that Ham was cursed and became the servant of rothers' servants. It was owing to wine that the ancient Persians, lemonians, Romans—active, vigorous, and glorious by a thousand did victories, as long as they possessed the virtue of sobriety— ned and fell when—

Della stoica incude
Spessa nel vin tempravasi
La rigida virtude.

t that was the abuse not the use of wine.

ery one should know that wine, drunk in moderation or with *rance*, favors and augments the secretion of the gastric juices and ds digestion; it excites the imagination, awakens the memory, ls care, restores the physical force, and renders the movements of ody active and vigorous.

proof of this, if one is needed, is furnished by the fact cited by all rs on hygiene, that if in the war of 1870–71 the German army was to sustain the fatigues of the campaign and sieges, always remain- n good health, it was because they were invading and conquering ne-producing country.

cchus is the "Dio salvatore." Plutarch, in the life of Cæsar, ions that the whole army of the General was once afflicted with a

disease which Cæsar cured by allowing all the soldiers to get solemnly drunk. From that day they all commenced to recover.

Certainly among the curative resources at the disposal of hygiene and medicine there is none more frequently used than wine. We always, as it were by instinct, say to a convalescent: "You should drink wine."

Hippocrates says: "Wine is a liquid marvelously adapted to man, well or ill, providing he take it at the proper time and in quantities suitable to his constitution."

Liebig, too, is of the same opinion, for he writes: "Wine is unsurpassed by any product, natural or artificial, as a restorer of the vital forces when they are exhausted; it animates and revives the saddened spirits, it serves as a corrective and antidote in all irregularities of the animal economy, which it preserves from the passing ills to which inorganic nature subjects it."

Wine considered from an alimentary point of view has its chief importance in the union of alcohol with an acid liquid; the acid moderates the too energetic action of the alcohol, especially its action on the nervous system.

The tannin and coloring matter, when present in due proportion, exercise a very favorable influence on the stomach by animating the energies of the digestive functions.

The aroma, the bouquet, the "sève" of a wine are also useful, as many facts tend to prove, among others, the fact that well-flavored substances in general have a favorable influence on nutrition.

Wine has a density nearly equal to that of water, and is absorbed into our system with much less rapidity than spirits; this fact is of great importance to the animal economy, because the effects of wine are thus felt for a longer time and without the danger accompanying the rapid effects of brandy.

Wine is absorbed by our digestive organs without any change but that of being mixed with the gastric juice. There is no need of the intervention of the digestive ferments to facilitate the absorption of the wine in its last office of nutrition. This explains its utility in certain diseases.

The complexity of the organic matters that enter into the composition of wine, which up to a certain point resembles that of the human body, explains its restorative action in the case of individuals weakened by anæmia or insufficient nourishment, etc.

Wine, then, is produced and drunk, and of all fermented beverages it is the most healthful, and the one that most harmonizes with our organism. If nature had gifted man, as it has all other animals, with a surer instinct in the choice of the food that was best suited to his constitution, certainly without any hesitation among the first substances he would have selected wine; however, having a less reliable instinct than he might have, he has allowed himself to be greatly influenced by tradition and imitation in the choice of his beverages.

I.

CLASSIFICATION.

the numerous classifications that have been made, and that might de, of the various and diverse wines produced in the different wine- ng regions, that is to be preferred which, up to a certain point, can nsidered as the most natural, by giving an immediate idea of the pal characters presented by a certain wine or category of wines. pené very justly considers the classing of wines according to ent dishes or repasts as misleading and hurtful to the trade; for, well remarks in one of his articles, if this classification should be d out we should have tripe wine, cheese wine, macaroni wine, etc. ery one knows, the order of wines and dishes through the repast uenced by fashion and caprice. To-morrow, perhaps fashion will us to imitate northern nations and Americans in our "cuisine," hen we will be obliged to drink champagne through the whole r; thus champagne must be successively known as an oyster wine, wine, a roast wine, and heaven knows what else.

long since I was at a banquet, and by chance was placed next to ain high functionary who was to commence the series of toasts. e appearance of the roast our high functionary prepared himself. how is this," he exclaimed to a neighbor, "do they not give us pagne now?" "They serve the 'roast wine' now," replied the "Roast wine," cried the surprised high functionary, "but at they serve champagne with the roast." Champagne was after- brought, and then the eminent personage was able to get up and his toast, a very appropriate and happy one. I cannot say what nce the "roast wine" may have had on it.

s classifying by dishes is certainly all wrong, but if we should urselves the question, as an amateur does in the wine taster's *vade*, "*La vite ed il vino*," "When should one drink wine?" the r most certainly would be, "Whilst eating." Without a good ion of wines the most perfect bill of fare loses all its value.

h-class red wines should not be drunk before they have been eight years in bottle. Before that they may be rough, and not particu- pleasant to the taste. Very fine white wines, too, should be well otherwise the sugar, of which they contain a certain amount, will ave been all transformed into alcohol, and lessens their strength ouquet.

atural, primary, and main division of the various wines may be with reference to their color, viz.:

WHITE AND RED WINES.

hould be stated here that this general division rests not only on the that the wine may have, or on the presence or absence of œnocy- in its composition, but on other characteristics in which a white differs greatly from a red.

This division is of no little hygienic importance, wines of different color having as distinct effects on our constitution as wines of different age, alcoholicity, or acidity.

White wines, as is well known, are obtained from white grapes, or from red grapes which, instead of being crushed and fermented in a mass, are pressed, and the must fermented separately; that is, not in contact with the pomace or solid parts of the grapes.

I call attention to the fact that white wine can be made from red grapes, because wines so made have exactly the same action on our system as have white wines made from white grapes.

Certainly the following from Guyot is very true:

Wine which has been fermented in contact with the stems, skins, and seeds of the grapes is very different from that which has been fermented separately. The latter wine is white, the other red, and the antithesis, though expressed here simply by the opposition of color, does not consist in the least in this difference of color, which is only an accident. The real difference consists in the special and often opposite hygienic qualities of these two kinds of wine. Nowadays they make red wines which have all the hygienic properties of white wines, and it is possible to produce white wines which would have all the hygienic properties of red. All that is necessary to obtain this last result is to ferment the must of white grapes with the skins, seeds, and stems, in the same way as red wine is treated; in this way all the effects are obtained of a rapid decomposition and solution by maceration of the principles and products which are not found in the juice of the grape. * * *

I insist on the true distinction of wines obtained by the fermentation of the juice of the grape completely isolated from its accessories, and those made by fermentation of the juice, together with all, or at least part of the rest of the grape—a distinction quite independent of the color. Nothing is more alien or of less importance to the quality of a wine than its color. It may be a sign—an indication—but it is never a quality of itself. By the majority of consumers color is looked upon as a guarantee of the purity, quality, and strength of the wine. It is on account of this considering color as a sign of quality that unscrupulous dealers make use of it to commit innumerable frauds.

White wines are in general diffusible stimulants of the nervous system; if they are light they act rapidly on the physical organization, of which they intensify all the functions. It seems that they escape just as quickly through the skin and mucous membranes, and, above all, with the urine; their action, then, is of short duration.

Unlike white wines, red wines are tonic and persistent stimulants of the nerves, the muscles, and the digestive organs. Their organic action being slower is more prolonged; they do not unduly excite the perspiration nor the excretions, and their general action is astringent, persistent, and concentrated.

Moreover, the common opinion, founded on daily experience, leaves no doubt of the real difference, in their sensual and organic effects, between white wines and red.

Of equal importance are the following words of Dr. Gauber:

If one should divide the grapes gathered from a vineyard of the "Graves" of the Gironde into two parts, and of one make white wine and of the other red, and then, at the end of four years, make a careful tasting of these two wines which have been carefully treated during these four years, what will be the result? Made from a raw material apparently identical, will they be equally developed and equally mature? The white wine will have aged the most.

Will they produce the same effect, the same degree of stimulation, on our organs? Let us collect the sensations produced by one and the other in the order in which they are produced.

1. A glass of white wine, well made and dry, the moment it enters the mouth develops a bright and penetrating aroma, and leaves, in passing, an impression, agreeable it is true, but fugitive and almost hot. Hardly has it reached the surface of the stomach when it causes a feeling of warmth which, in less than ten minutes in the case of certain healthy but impressionable constitutions, becomes very intense. Sometimes the action, by sympathetic radiation, is reflected from the stomach to the head with the promptitude of the electric fluid. Generally, after an hour or less, a sensation is felt as of a pressure either on the two temples or around the whole head; the hand is instinctively passed over the forehead as though to free it from some load. Sometimes a feeling of painful fullness of the brain accompanies these effects. The irritation is communicated from the gastric and nervous centers to the whole body. It shows itself by increased warmth, often irregularly distributed, of the body (with irritable people the palm of the hand often becomes unpleasantly hot and dry); by a need of movement, of displacement rather than of exercise (with people of the disposition mentioned above this need is shown by an internal agitation, by slight muscular tremblings accompanied by shooting pains that strike, with the rapidity of lightning, different parts of the body).

end of two or three hours, more or less, according to the temperament and susity of the individual, the irritation passes away and the taster finds himself in e condition as before, with or without a certain feeling of lassitude or sadness. the white wine is replaced by a red wine of the same vintage, and taken at a temperature, it will leave in passing a distinct impression on the two senses of nd taste of a soft aroma; its fluidity in the mouth is less, and though it feels aterial, so to speak, it leaves a less intense feeling of dry heat. Its contact with nach produces a softer and more gradual impression.

rgan is still warmed, but in a more vital manner, as it were. As to the sympa-ropagation of the stimulating action towards the head, it still takes place, but the nervous phenomena of pressure and pain; the brain is gently excited. Its on to the organs of the senses, if it takes place, is no longer betrayed by the need acement and agitation, but by a strengthened desire for exercise, which is very t. The duration of the stimulation is more prolonged and ceases insensibly, so most attentive observation cannot detect the exact time at which it ends.

is, we believe, the sufficient explanation of the difference of effect observed white wine and red wine—the first (white wines of Graves), produced by fermen-f the must separate from the pomace, contains about 4 to 6 per cent of extractive and tannin; the second, 8 to 11 and 12 per cent of the same matters.

o this difference in the proportions of the rough and astringent matters of the hat we attribute their different effects.

red wines the pressure of the alcohol on the nervous system of the stomach is l by the interposition of more abundant tonic and extractive matters; the effect low and successive. In white wines it is almost immediate, and therefore stronger lasting.

h of these large groups into which the various wines may be d is susceptible of three subdivisions, which are sufficiently l, as they give immediately some idea of the quality of a wine enters into any one of them.

se three subdivisions are the following:

'able wines.

)essert or alcoholic wines.

3lending or cutting wines.

1. *Table Wines.*

se wines may be of higher or lower quality, according to the y in which they are produced, and to the care that is taken in naking and after-treatment; they must not be sweet nor too alco- not aromatic nor possessed of too pronounced a bouquet, though of higher quality may be slightly aromatic; they must not be too color, too astringent, nor too acid; they ought not to be harsh nor of avy body, that is, too rich in extractive matter.* A wine of this should be clean tasting, and should form an harmonious whole, ble to the palate and stomach, so that it can be drunk with re. These wines are healthful, because they favor digestion, and in quantity of them can be taken without producing intoxication er physical disturbance.

cisely the characters of a typical table wine may be described as s:

ht but not poor in alcohol; not the slightest tendency to sweetness; ng but light and delicate aroma and flavor; nothing excessive, mplete harmony of all parts. A full and generous homogeneity; lity; constancy of type. Though in the matter of dishes variety

the middle of the seventeenth century England consumed the light wines of , and, as Gladstone says, they laughed and sang in those days in the British realm. rs between France and Great Britain breaking out, the French wines were pro- and in their stead the heavy wines of Spain and Portugal were imported; they nk as much, continues Gladstone, but they sang no longer; to laughter succeeded s and base deeds."—R. Dejermon.

is both useful and pleasing, it is different with wine where constant uniformity of type is necessary.

As in this class of wines are comprehended all qualities from the finest to the most ordinary, it is easily seen that other distinctions can and must be made, in order that the wines, for example, of Barolo or Chianti, shall be distinguished from wines produced in some less favorable locality.

The various wines that enter into the category under discussion can be naturally and conveniently classified as follows:

A.—Superfine, or high-class wines; the "Grands Vins" of the French.

B.—Fine wines.

C.—Fine common wines.

D.—Common wines.

E.—Low-grade wines.

This classification, as Polacci would say, has nothing imaginative or strained about it, as it simply represents the wines that we really have and of which we make use in commerce.

I will now try to give, not a definition, because the name of each class is of itself a definition, and should give a fair conception of the distinction to be made between the several classes, but an idea regarding the characteristics which have served in grading the wines which we actually produce in Italy.

A. *High-class Wines.*—These are wines which are produced in certain spots, or rather which are obtained from certain varieties of grapes, grown in especially favorable conditions of climate, and more particularly of soil, compared with those of the circumjacent vineyards; wines which also, it may be said, are the product of an almost infinite series of careful treatments, beginning in the vineyard and continued through the vintage and during the whole time, which is certainly not brief, of their conservation; wines, in short, which unite in themselves all the characteristics and qualities which should be found in a fine wine, united with the greatest delicacy and fragrance of aroma and freshness on the palate. An Italian wine which belongs to this class is the Chianti di Brolio. Of the French wines of Bordeaux, or more precisely of the Médoc, there are Chateau-Lafite and Chateau-la-Tour, the latter of which is distinguished from the former by a slightly heavier body and a more pronounced flavor and aroma.

B. *Fine Wines.*—These are wines which approach very nearly to the preceding class, but are, nevertheless, somewhat inferior to them, either in delicacy of aroma or in some other quality; very often they lack or are deficient in the freshness which distinguishes the first class. These wines are very often the product of grapes grown in the neighborhood of the vineyards producing the first-class wines which have given renown to the locality, but they may be made from grapes grown in other localities. To this second class belong, for example, those wines of Chianti which resemble greatly in character the Chianti di Brolio, but do not equal it. In the same way among the French wines of the Médoc, Saint-Julien and Saint-Estephe approach but are not equal to Chateau-Lafite.

It may very possibly be that some of the wines of Chianti exhibit qualities which place them, so to speak, in rank with the Chianti di Brolio; then from the second they must be promoted to the first class, as is the case with Chateau-la-Tour, which, though somewhat different, is

d worthy to stand in rank with Chateau-Lafite and the other two, ux-Margaux and Chateau-Haut-Brion, which together form the grands vins," high-class wines of the Gironde.

Fine Common Wines.—In this third category are placed those which are intermediate between the fine wines and the common This class of wines can be produced in large quantities in Italy, e are numerous regions both in the hills and plains which pre- e requisite favorable conditions.

wines in question generally lack or are deficient in delicacy; ime, and sometimes, too, with a little artificial aid, they acquire roma which is not, however, always very delicate. These wines r ought to form, the bulk of our export trade; but if we wish to do dy trade we must set ourselves diligently to make and properly these wines. To do this the producers must abandon the idea king high-class wines, and confine themselves to wines of this

wines of this class produced in Italy, especially by those who ecourse to artificial additions, or who do not well understand the es of wine making, present a certain dryness to the taste which exactly pleasing.

taster will pronounce them sound wines without any particular but he is not quite satisfied. This may be owing to an artificial or to the addition of alcohol; it may be caused by heating, or by violent fermentation, to the grapes having been picked at the time, or to an injudicious correction of the must, or—but as this the place to try to account for it it will suffice to state the fact.

artificial aids, then, as the addition of drugs, the drying of the heating, etc., should be abandoned, and instead a judicious choice s, or a blending of grapes or wines substituted; in this way it possible to deliver to the trade wines which have a sufficient ess of taste and frankness of flavor; they will be to a certain smooth and delicate, and will possess more or less of that fruity o much liked by consumers.

Common Wines, or Wines of the Plains.—This is a class of wines ch it is not very easy to give a definition or to point out its exact in order that it may not be confused with the preceding or com- ded in the following class. To prove that this is a real difficulty suffice to quote the eminent agriculturist, F. Re: "I have some- drunk wines made from grapes grown in a naturally clayey soil, ted to irrigation, which were very good, and some even which l to be of superior excellence."

ould therefore state that all wines grown on level ground cannot ssed as common wines; even on the plains, when the climate and lly when the soil and the variety of grapes are particularly favor- hoice wines may be produced which are worthy to figure in the ing class.

division or class of common wines comprises all those wines con- in the largest quantities, and which, because of the ease and ny with which they are produced, can be sold at a low price, so that nd steady consumers among the working classes, who consume, ll, the greater part of the product of the vineyards.

se wines are most commonly the product of grapes grown on the either in vineyards or associated with other crops; this does not

exclude the possibility of producing such wines from grapes grown on hills, and especially when the exposure is unfavorable, or when the nature of the soil is unsuitable, or when, on account of the ignorance of the grape grower, who prefers quantity to quality, he plants by preference those varieties which give an abundant crop of very inferior grapes. Wines of this class have very poor keeping qualities, lasting two years at the most, and in general in aging, with the exception of those which are very rough and astringent, deteriorate instead of improving.

These wines are sufficiently alcoholic, but owe their conservation less to their alcohol than to their acids, among which, with many of them, must be included carbonic acid. To their acids, also, they owe most of their hygienic value, which is to aid in the digestion of the food consumed by the laborers who drink them—food which is naturally difficult of digestion, and rendered more so by its ill preparation.

These wines are more nutritious than are those of the preceding class, containing, as they do, larger quantities of albuminoids, in which grapes from the plains usually abound. The reason of the greater abundance of nitrogenous matters in inferior grapes is the natural fertility of the soil on which they have been grown, or the fact that this ground has been manured with nitrogenous fertilizers, with the idea of increasing the bearing of grapes or the production of wood and foliage.

These wines are naturally very variable, differing greatly according to the conditions of soil, climate, and aspect under which they have been produced. To further increase this variability man does his best, seeming to take a delight in practicing methods of wine making that are apparently ingeniously calculated to spoil the wine.

A wine of this class should be of easy digestion, and easily consumed in moderate quantities, without affecting the head or the stomach. It should be smooth, clean tasting, well fermented, with a certain amount of flavor and acid, and should show none of the effects of secondary fermentations to which these wines are so subject; finally, it should possess a good, bright, but not deep, color.

I have said a wine of this class "should be" all this, because only too often, on account of careless making or improper handling, they are anything but healthful; they are, on the contrary, heavy and indigestible, causing, even when used sparingly, disturbances of the head and stomach; they are heavy-bodied wines, and so thick as to be appropriately called by some people, "vini carnosi;" their defects are usually due to the vessels in which they have been made and kept, to bad fermentation, or to the addition of substances which have been put in with the intention of preserving the wine, or of masking its defects. They are often costive and overcharged with tannin and coloring matter, recalling, the moment they touch the palate, the flavor of ink. Their color is generally unstable and dull.

E. *Low-grade Wines.*—These wines occupy the lowest grade on the œnological scale, that is to say, among natural wines. In drinking one of these wines one asks himself if it is really a wine or not rather a piquette or mixture of water and wine, with superabundance of the former. Except color, these wines are deficient in all the elements proper to wine. They must be consumed promptly during the winter, or they cease to be wine. Generally, to render them drinkable at all, they must be left for some time on their pomace, or on that of better

; or else they can be cut with other wines, or be given the treat-
usual in Tuscany, known as the "governo."
en these wines are sound they do very well for cutting with other
thus making a blend which can be classed with the common
or even sometimes with the third class, or fine common wines.

2. *Dessert or Alcoholic Wines.*

 class includes all those wines which the French call "vins de
and therefore champagnes and other sparkling wines, which, how-
re, unlike most of this class, of relatively low alcoholic strength.
kling wines are placed here because, as a rule, they are of high
nd therefore "vins de luxe." However, we are now producing
l wines which are afterwards artificially made sparkling, at a
less cost; and this industry is assuming such proportions that it
 well be overlooked.
aratus of different kinds for the production of sparkling wines
een known and used for a long time in France, Germany, and
a.
erly the practice of artificially making champagne from natural
nes has been extensively followed in Italy; this is due to the in-
n of the apparatus of Carpené, which possesses above all previous
s the advantages of simplicity and cheapness. This system has
ed possible the production of good sparkling wines at a moderate

h this explanation regarding champagne, and the reason for plac-
in this class, I pass to those wines more properly belonging to it,
re give Polacci's definition of "vini di lusso."
se wines are nearly always alcoholic, more or less aromatic, and
ink, as a rule, after dinner, on which account they are called by
ers dessert or after-dinner wines. They are, so to speak, concen-
and are sipped from small glasses like cordials, for which reason
ench know them as "vins de liqueurs." We know them as "vini
o," because they are certainly not necessary beverages, and from
igh cost are usually reserved for the tables of the rich.
many and diverse wines of this class can be divided, or rather
, under the following heads: Sweet Wines; Alcoholic Wines; Spark-
ines.
his class are wines so well known, and of such special character,
is difficult to class them together, and each is usually spoken of
lf as almost forming a class apart; as with the wines in the first
the "grand vins," their qualities and peculiarities are so well
 that their names alone is a sufficient description; such wines are
la, Lacrima Christi, Vernaccia di Sardegna, Malvasia di Lipari, etc.

3. *Cutting Wines.*

se wines are rich in alcohol, coloring matter, and body, but often
nt in acid; they cannot be drunk alone, and the only reason for
cing them is that there are localities which produce wines which
in, poor in color, weak in alcohol, and generally lacking in those
ies which wines of this class have in excess. A mixture of these
inds of wine, each of which alone is of little value, produce a wine
is sustaining and nutritious, and especially suited to the needs

and means of the laboring classes. The better kinds of these wines may even be blended to form a wine which might be placed among the fine common wines, or third class, and not unworthy of the honor of bottling.

At the present day the French wine merchants use large quantities of cutting wines imported from Italy, Spain, and Dalmatia. Before the invasion of the phylloxera, their blends were made with the wines of Roussillon, Languedoc, Pyrenées-orientales, Aude, Gard, Tarn, etc., all wines rich in coloring matter and alcohol, solid and heavy-bodied, and at the same time smooth, delicate, and with a characteristic and persistent aroma which is very pleasing.

Here is, for example, a blend or mixture of different wines formerly much in vogue in France:

Wine of Roussillon	30 litres.
Wine of Narbonne	60 litres.
Wine of Cher	30 litres.
Wine of Poitou, blanc	60 litres.
Wine of Bourgogne	30 litres.
Wine of Pique-poule, at 15 per cent	15 litres.
Total	225 litres.

A French writer thus justly expresses himself: "After the invasion of France by the phylloxera, commerce drew contributions from all wine-producing regions; science was also brought to its aid; an immense productive movement commenced, not only in France, but in foreign countries, and now wines flow in from all parts, from Spain, Italy, Austria, Greece, the Crimea, and even from Australia; wines of all kinds, which, passing through the skillful hands of our merchants, there receive the official seal, the inimitable touch, which serves them for passport to the wine connoisseurs of the entire world." Further on we read: "In this combination each region plays its role, and helps towards the final result that we desire to obtain; from Italy the blend obtains strength, extract, body; Spain supplies softness and fruitiness; our own wines add piquancy, and economize on the price of production."

In whatever way the cutting is done, and whatever the combination adopted, the following may be taken in general as the composition of most blends:

One third wine of Italy;

One third wine of Spain;

One third "petits vins" of France, or wine made from dried grapes.

Cutting wines are then of no little importance to wine growing in France, or rather to the French wine trade; why then, should they not be as important to ours, especially now that the two are in competition?

Let us then produce cutting wines, but let them be well made and sound. By such wines the Italian wine trade will be benefited as much as is the French now.

II.

TASTING.

word "tasting" is not used with its ordinary signification when
ıg to wine, but means, in that case, not only the testing of its
by means of the gustatory organs, but also a careful examination
wine in other ways; of its appearance, of its bouquet, as well as
effect upon the palate; all of which is necessary before a final
ent can be passed on its character, its qualities, and its defects.
e tasting is a somewhat difficult art, which cannot be acquired
t long practice, and then only by one who possesses a clear eye
ry delicate organs of taste and smell. When the last two organs
he requisite sensibility, practice alone is necessary to give them
ll needed in tasting a wine.
by frequent tasting, by making comparisons, by the examination
types, that this delicacy and sensibility of the palate is developed
enables it to detect and appreciate the faintest aroma, flavor, or
t, as well as the slightest defect.
tically the tasting of a wine is, up to a certain point, of more
ance than its chemical analysis. Analysis shows us the principal
nents of the wine and the proportions in which they are combined;
tells us whether these components are in proper proportions to
ı harmonious whole, or are, some of them, in excessive or deficient
ts; whether the wine has "sève," bouquet, aroma; whether it is
or not; whether it should be racked or bottled; what its defects
keeping qualities, etc.
one can say whether a wine pleases him or not, but only the
nced taster can pronounce with any degree of certainty on the
operties and character of a wine. A good wine may be pleasing
and not so to-morrow, on account of slight exterior influences
are dangerous to its stability but may be only transitory in their
and the wine may recover and be as good as ever.
rder to make useful deductions it is of the highest importance, in
solutely necessary, to be able to appreciate and reflect on the sen-
experienced in the tasting. It is not every one who can appre-
he true import of what they perceive, but only those who have
l themselves by long practice.

experienced taster, when called upon to give his opinion, looks at
tentively examines the wine. He then agitates it by shaking the
and, when necessary, places his hand round the glass in such a
to warm the wine, thus favoring the volatilization of those mat-
hich affect the olfactory organs; he then tastes it.
etimes the simple agitation of the wine by twirling the glass is
fficient, especially when the sparkling and bouquet are to be par-
ly noticed. In this case the wine must be more thoroughly
ı, which is done by placing the palm of the left hand over the
of the glass, and then striking the bottom of it forcibly against

the knee. This causes the wine to give off its odors, and in the case of sparkling wines its carbonic acid, more freely. The method, writes Ottavi, is not very polished or elegant, but accomplishes the purpose very well.

As can be easily seen the wine taster should preserve his senses, that is, those of smell and taste, with their utmost sensibility; this is only done by avoiding excesses of all kinds, for these in course of time are bound to diminish that sensibility, or to destroy it completely. Thus he must abstain from all highly alcoholic beverages, from strongly salted or flavored dishes, from tobacco in any form, and in general from everything that acts too energetically on the organs of the above-mentioned senses.

Physical indisposition, more especially affections of the nasal organs, the mouth, or throat, diminish or destroy all sensibility of the senses of taste and smell.

"Wine should not be tasted fasting, or it will taste weak and insipid; nor after drinking wine; nor with a full stomach. Moreover, the taster should not have eaten anything sour, salt, or bitter, nor anything which might change his taste; but he should have eaten a little, but not yet have digested it."—Carlo Stefano.

The taster should not attempt to give his opinion of more than a certain number of wines at a time, as after having tasted a certain number the senses become temporarily much impaired and incapable of nice discrimination; nor should he judge of a wine after an abundant repast, as the various flavors of highly seasoned or sweetened foods have a great influence on the palate, and prevent it from judging a wine critically.

It is a well-known fact that after eating sweet fruit a wine seems to be rougher and harsher than it really is, whilst cheese, nuts, artichokes, etc., make it appear smoother and more delicate.

With piquant cheese, like Parmigiano and Roquefort more especially, which Grimod de la Reynière has called "the tippler's biscuit," all wines seem good, or at least much better than they really are. It is also true that strong and badly tasting wines when drunk undiluted destroy the sensibility of the palate; people habituated to these wines end by being unable to find any taste in the fine wines of delicate flavor which are the delight of the connoisseur.

Tasters who are accustomed only to high-class wines, when they taste ordinary or low-class wines are apt to underrate them, if they do not reject them as altogether valueless, though they may be sound and clean tasting.

On the other hand, tasters accustomed to ordinary wines almost always deem the prices paid for high-class wines excessive.

This suggests the importance of habit as a factor in the modifications which the taste may undergo. It may easily happen that the prolonged use of a substance may render the sense of taste obtuse, and that the tongue may become "saturated," as Brillat-Savarin says in one of his happy aphorisms. Thus, when the palate has become habituated to a taste, that which at first was intolerable becomes often pleasing and even necessary. Generally, however, habit educates the sense of taste and renders it acute.

Sometimes a taster is called upon to give an opinion as to the character,

good or bad qualities of a wine of a certain locality or of some par-ular producer or vineyard; in this case, even though he may be well quainted with the kind of wine, to be able to give his decision with re confidence, he will carefully provide himself with a wine of the ne type as that which he is called upon to judge; he can thus receive terial aid by making a comparison.

Naturally, a taster who is used to the wines of a certain locality or intry will be more easily able to detect the slightest differences ween the wines of that locality, especially those differences in fine es which distinguish wines produced by different vineyards even in same locality, and when planted with the same varieties of grapes.

A taster should be very cautious in giving an opinion of a young ie, or of one whose origin is unknown, and of pronouncing on its in-sic worth; the youth of the wine will often mask defects, which, er, become apparent.

When it is found necessary to taste several wines in succession, it is a d practice to eat a little dry bread between each wine, or to rinse out mouth with a little fresh water, to neutralize the palate, so to speak.

It is always good to rinse out the mouth with fresh water before com-ncing to taste.

Before commencing the tasting, or rather the final tasting—that on ich is based the concluding judgment—the wines should be sorted; example, if the wines are of the same kind, but of different ages, it best to begin by tasting the weakest, thinnest, or greenest wines, erving the maturer wines and those which are more aromatic, smooth, alcoholic for the last.

The same is true when there are many and diverse wines, as at an position. In this case the tasting proper should be preceded by an anging of the various wines, a thing which is not done at all, or dly done as a rule, much to the detriment of the exhibitors. This ection should be based not on the labels on the bottles, or on the tements of the exhibitors, but on a preliminary tasting; in this way se who are to judge the wines will not be presented successively th different types of wine, with wines of different qualities and ages gether, and, as is unfortunately the case, sometimes with defective or d ones.

There are tasters who are ready at any time to pass judgment on a wine; ey will even taste directly after smoking. Their opinion, to say the st, is of little value.

A good taster is not always in condition to exercise his art, and for at reason must sometimes refuse to make a tasting when he does not l in a state to judge critically.

Here I may appropriately remark that the wine dealer often relies too uch on the lack of delicacy of taste on the part of the consumer. He ould remember that among his customers there is occasionally a con-isseur, or at least a fairly good taster, who can appreciate the wine at s true worth, and whose opinion is followed by the majority of his other stomers.

A little advice is needed also by those who are called upon to judge mpeting wines at exhibitions or elsewhere.

Without exaggeration, I may say that there is scarcely a person in

Italy, connected in any way with wine, who has not been called upon to act as judge in competitions of this kind. I need not say how much harm this has done our national wine industry; I will simply, with Polacci, express the desire that we might see some day in Italy "una vera magistratura enologica," a body of competent men to look after these affairs.

We will now return to our tasting. The forenoon is the time best adapted for wine tasting; the wines are of the proper temperature, a temperature which varies for red wines between 54° and 60° F., and for white wines between 50° and 54° F.; the taster is in good condition, and consequently the tasting may begin.

There should be no bad odors present, and the place in which the tasting* takes place should be well lighted with diffused light, not obscurely through a small and narrow window, nor too brightly by the direct rays of the sun; it should be remote from all noise, where the taster can remain quite undisturbed.

It is a fact admitted by physiologists that the senses exercise a mutual influence on one another, so that anything that excites one sense has the effect of increasing the acuteness of the other.

This reciprocal influence seems to be confirmed by the recent researches of Dr. Albertini, who says that the defect of color-blindness is accompanied by a corresponding deafness for certain sounds. Thus, those who cannot perceive red cannot distinguish *sol*, while those who are color-blind for green are unable to recognize *re;* to this lack of oral perception is joined the inability to reproduce these notes with the vocal organs.

"The taster," writes Franck, "should be deaf and dumb; deaf, in order that his judgment of the various qualities and defects revealed to him by his senses may be undisturbed; dumb, in order to prevent the expression of a hasty or insufficiently considered opinion."

Every one has noticed how a gourmand will close his eyes in order better to appreciate the delicate flavors of a substance, thus bringing his mind to a proper state of attention by the absence of all other excitement. This will explain the exclamation of the court parasite, who, disgusted with his too turbulent table companions, cried: "Hush! You do not understand what you are eating."

*Here the question asked in "Conseils d'un amateur:" How should wine be drunk? might appropriately be answered. In our opinion, in order that the benefits of drinking it may be enjoyed in their fullness, the first thing necessary is that the wine shall be presented in the manner most pleasing to the eye and to the palate, for this impression on the senses has a most important influence on the rest of our body. With this end in view we should be scrupulously careful to have the wine at the exact degree of temperature that the nature and quality of the wine demand for the proper development of its flavor and bouquet, and then to make a judicious choice of the kind of glasses in which it is to be served. For Bordeaux, Burgundy, Chianti, Barolo, etc., the proper temperature is that of the dining-room, where they should be placed for some hours before they are to be consumed. White wines, sweet wines, etc., must be of the temperature of the cellar, that is, supposing the cellar is very cool, otherwise it is necessary to cool the wine, either by placing the bottles *on* ice, or by placing them in water containing a few lumps of ice, but never *in* the ice, for that completely destroys the character of the wine. Champagne is the only wine that may be put in ice, but even in this case discretion should be used, and if the wine is put in ice for three or four hours before being used it will be found sufficient, and the wine should then be served directly from the bottle. It is then a great mistake to place wine in ice or in freezing mixtures, for a wine so treated destroys the appetite and is injurious to the health.

The practice of pouring champagne into decanters containing ice cannot be too strongly deprecated. In the first place, it is not wine you drink, but a mixture of champagne and water; and secondly, the temperature is never right, as it cannot be regulated.

Let us add that ice should never be put *into* wine, for it destroys the bouquet and flavor of the wine, and if it gives a momentary pleasure to the palate by a sense of coolness, it also renders the digestion slow and laborious.

The taster should be provided with a porcelain cup, or with the Bor-elais silver cup, which, however, may be made smooth, and if so, the ottom should be a little raised; this cup is especially applicable to oung or blending wines, as it is the best for observing the tint and tensity of color and the degree of limpidity.

There are two kinds of Bordelais cups; one preferred by the sellers, ıd the other by the buyers.

Naturally the seller tries to show off his wine to the best advantage; r this purpose he prefers a cup with a raised bottom, bright, shining ollows in the sides, and a large rim, on which the rays of light have a easing effect.

The high rim and the yellowish tint that the maker gives to the silver the cup concur to improve the appearance of the wine. The buyer's ip, on the contrary, is of silver of its natural color, and without the aggerated rim, and without anything that might modify the appear-ıce of the product to be examined.

In Bordeaux they prefer a cup almost without border, a kind of plain ucer, having in the center a slight convexity. In this cup the wine opears exactly as it is, without the slightest artificial alteration.

Lately the buyers of the Gironde have begun to use the twin cup—ıat is, two cups joined together with a hinge—by means of which it is ossible to have two wines, which it is desired to compare, in almost the ıme conditions with regard to light.

Besides the Bordelais cup he should have at his disposal glasses various forms, but all thin and homogeneous. Some should be ıalice-shaped, but not too long; some of the shape known as "Borde-is;" some cognac glasses, narrow at the mouth and widening below, ıat is, truncate egg-shaped. By means of the latter, the bouquet, fra-ance, and odors generally can be best perceived, especially when their isengagement is aided by shaking.

Conical glasses, on account of their form, serve very well to judge of ıe color of a wine, as according to the height in the glass where the ine is examined, there will be a greater or less thickness for the rays light to traverse. Between the two extremes the differences of tint he gamut of color going from rose to red in the case of red wines, and om white to golden in the case of white wines) is very interesting, and ıay sometimes give very useful hints.

The different aspects under which a wine can be considered are so umerous, there is such an almost infinite number of possible differences the various qualities and defects that have to be considered, that even ıe most expert taster would find himself in great perplexity without a roper and systematic arrangement of his sensations. To avoid this erplexity he proceeds as follows:

He takes a glass containing a small quantity of the wine; raises it to level with his eyes, examining it carefully first at arm's length, and fterwards more closely; raises and lowers the glass in order to view the ine from above and from below. By inclining the glass and viewing it different positions, by giving the wine a rotary motion, making it rise p the sides of the glass, he is assisted in his observations. In this way he taster learns all that can be discerned by the organ of sight, namely: he color or colors, the degree of limpidity, the disengagement of bubbles f gas, and the degree of persistence with which they cling to the sides f the glass.

Its appearance is, to a certain point, a sign of the condition of the

wine; from it the taster receives his first impressions and begins to form his opinion; this opinion is as yet, however, very relative, and rests only on probabilities, as a good wine may possibly wear the aspect of a bad one.

"Limpidity and vivid color are favorable signs," writes Guyot, "but they do not constitute high quality, though the contrary appearances are real defects."

Thus, though the eye may be pleased, the nose and palate may not be.

The experienced taster will be able to tell, to a certain extent, whether the color is natural and homogeneous, and so to a certain extent whether it is artificial; in this latter case he will be able to make a probable guess at the nature, vegetable or mineral, of the substances used to give color to, or to enhance the color of, the wine.

The estimation of the color of wine is very important, especially with cutting wines which are to be mixed with others to obtain the type demanded by customers.

The eye having fulfilled its office, it is the turn of the olfactory organs.

The sense of smell resides in the ample nasal cavities, and more especially in the pituitary, the mucous membrane which lines them. Odors, or better, infinitesimal particles of substance, reach this membrane by means of the external organs of the olfactory apparatus, that is, by the nostrils; they may also enter by the internal nostrils, the two openings which put the nasal cavities in communication with the larynx.

Physiologists admit that the sense of smell is not provoked only during inspiration but also during expiration, though in the latter case much more weakly. Thus, Franck tells us that it is during expiration that we analyze the perfumes of wines.

Besides the expiratory movements that we execute, sometimes quickly and intermittently, sometimes slowly, in order to place fresh portions of air in contact with the mucous membrane, the cavities formed by the folds of the mucous membrane are of great aid in the perception of odors, as the air laden with odorous particles accumulates in them, and thus prolongs the impression. The mucous membrane may be more or less sensitive according to its relative state of dryness or humidity, which, as I have shown, are much affected by colds in the head. When too dry the cellules are almost indurated, and when too moist they are separated from the air by a watery layer which prevents their regular action.

As may be supposed from the foregoing, the sense of smell will receive two impressions, or rather, will receive impressions at two different times, the first before the wine is tasted, and the second when the tongue and palate have almost finished their action; that is, when the taster commences to swallow the wine.

The sensations received the second time are various and very different from those received at first.

The first sensations are those caused by the readily volatile substances that the wine contains, and which are given off at the ordinary temperature of the wine, and without other assistance than the shaking and motion given to it by the hand of the taster.

The second series, which is perceived during or after swallowing the wine, is caused by the substances which are volatilized by the increased temperature due to the heat of the mouth and to the wine being well

subdivided" by the tongue, and finally to the action of the juices ecreted by the various parts of the mouth.

The taster having thoroughly examined the appearance of the wine, fts the glass to a convenient distance and inhales the odors which are iven off, and which fill the upper part of the glass, sometimes shaking r striking the glass to aid their giving off.

A wine may give off various odors, good or bad. I will treat of both f these when I come to describe the qualities good and bad which a 'ine may present.

Before proceeding further with the tasting it will be interesting to epeat the observations of Guyot, and of Brillat-Savarin, the "modern picure," regarding the colors and aromas of wines.

"The aroma, like the color," writes Guyot, "is a favorable or an un-ıvorable, an agreeable or a disagreeable sign; but wine is above all an limentary beverage; it is well that sight and smell should be satisfied, ut it would be puerile and ridiculous to give undue importance to the atisfaction of these two senses, and to found the pretensions of a wine) superiority exclusively on its pleasing effect on one or both of them.

"I make this remark expressly because there are many hosts who ave a troublesome habit of insisting that their guests shall continually ıhale the odors given off by their wine, and especially insist on their melling their empty glasses during a great part of the dinner, at the isk of making them die of thirst.*

"The connoisseur, like the taster, knows perfectly well the importance f the color and bouquet of a wine, but he knows also that their appre-iation should be immediately followed by the introduction of the liquid ıto the anterior portion of the mouth.

"The color and the bouquet are two introductory notes of a gastro-ıomic theme. Alone they have but a relative value, and give but a artial impression of the whole theme."

Brillat-Savarin, who is an authority in matters of taste, writes, in is "Physiologie du Goût:"

"For my part I am not only persuaded that without the sense of mell there is no complete tasting, but I am tempted to believe that taste nd smell constitute but one sense, of which the mouth is the labora-ory and the nose the chimney; or to speak more literally, of which the ormer serves to taste the tangible parts and the latter the gaseous."

Thus, for example, when we eat a peach, the first thing that strikes us s its perfume; when we place it in the mouth we experience a sensation of coolness and acidity which invites us to continue; but it is only vhen the mouthful is swallowed, when it passes beneath the nasal cavi-ies, that we perceive the perfume, and the peach completes the impres-ion that it should produce. This will explain why the sensations which re usually accredited to the sense of taste are in reality much more omplicated than is supposed, and that touch and smell contribute in great part to the complex effect. It may be said that without smell aste would be reduced to very little and its agreeable sensations much nfeebled. Taste and smell combine with and complete each other, and Thomson has very justly defined them as the instruments of a unique

*Here Guyot might safely add that these people who are so troublesomely importun-ate are generally those who have recourse to the addition of artificial aromas to their wines.

sense. It is a well-known fact that if the nose be held whilst tasting a substance we perceive the fundamental tastes, such as sweetness, bitterness, salt, and acid, but all the delicate flavors disappear completely.

We have now arrived at the sense of taste, or, as some call it, the tasting proper. The sense of taste, with its somewhat complicated apparatus, is the one which has the most important office to fulfill; by it we decide whether the wine has the freshness, solidity, strength, delicacy, etc., in short, the qualities required by the most critical taster.

The principal seat of the sense of taste is the tongue, although it seems to have been proved that both the anterior face of the membrane of the palate and the posterior part of the palate are capable of receiving gustatory impressions.

According to the illustrious Professor Lussana, the tip of the tongue is distinguished by its ability to detect the finest gradations of flavor, whilst the posterior part, on the other hand, is distinguished by the intensity of its sensations, and is therefore more impressed by repugnant flavors.

Different parts of the organs of taste receive different impressions from the same sapid substance.

The action of sapid substances in contact with the tasting apparatus is somewhat complex, and is physico-chemical rather than mechanical, as formerly supposed.

For this reason the particular gustatory sensation due to any alimentary substance is felt more keenly when the substance is kept for some time in contact with the tasting membranes, as is the case, for instance, in slow mastication.

This time, however, should not be too much prolonged in tasting wine, or it becomes impossible to distinguish between the many and diverse flavors which a wine presents.

The taster, having now critically examined the wine to the best of his ability, by means of the eye and the exterior part of the organ of smell, must pass quickly to the domain of the sense of taste.

To this end, he slightly lowers his head, carries the glass to his lips, and introduces a sip of the wine into the anterior part of his mouth, where the sense of taste receives its first impressions.

The taster retains the wine in this part of the mouth for a certain time; and in order better to perceive the various flavors that affect this part of the tasting apparatus, he divides and subdivides the wine with the tip of his tongue, or as experts express it, he "breaks up" the wine, in order to increase the surface of contact between the wine and the gums, palate, and tip of the tongue.

As soon as the taster has received a distinct impression of all the sensations caused by the wine in this part of the mouth—that is, of those due to sugar, acid, tannin, etc.—he slowly raises his head, thus allowing the wine to pass to the posterior part of the mouth, when he takes a short breath and slightly gargles; at this stage of the operation he will perceive any earthy, bitter, or mawkish taste, or any taste of wood, cork, etc., that the wine may have; here he will also remark the alcoholic strength or weakness of the wine. The wine is then, so to speak, left to itself and passes into the larynx, the œsophagus, and on into the stomach.

As the wine passes down the throat it gives off odors which, as has been mentioned, ascend to the palate and the internal nasal ducts. The

ffect of these odors, and therefore of the qualities and defects of the ine, is intensified if the moment the wine is swallowed the mouth is noved as though masticating something.

It has been attempted to measure the duration of certain sensations; e., those due to the aromas, bouquets, flavors, alcoholic strength, and he various tastes of wine.

In general these sensations are perceived in the brief space of time of seconds, and their duration varies from 10 to 20 seconds. After the ine has been swallowed all the sensations disappear in about 7 or 8 econds. In certain special cases the aromas leave a more lasting npression; bad tastes persist longer than good ones. In some wines he aroma can be perceived for 55 or 60 seconds.

The sensation due to astringency is of short duration in fine wines, nd is much less intense than in the case of wines made from immature rapes, where it makes a violent impression on the lips and the sides of he mouth, which lasts sometimes for 100 to 110 seconds.

Different bad tastes have different ways of showing themselves; some re noticeable the moment the wine enters the mouth, while others are ot perceived till some seconds after the wine is swallowed.

Some moldy tastes do not manifest themselves for 7 or 8 seconds after he wine has left the mouth, but persist for 100 or 140 seconds.

The "goût de rance" is perceived in from 10 to 15 seconds, and lasts or 50 or 60 seconds. The bitterness of some wines makes itself felt in or 5 seconds, and persists for as much as 280 seconds.

In tasting, it should be kept in mind that certain qualities are liable o variations, according to the condition and age of the wine. The deliacy of a wine, for example, is almost totally hidden when the wine is oung; the more so the younger the wine. This is due to certain subtances which are proper to new wines, but which, later, are deposited nd disappear from the composition of the wine.

Aromas are more or less intense, according to their origin and to the ery variable circumstances under which they are formed.

The sense of taste is the final judge, and from its sentence there is no ppeal. But how much careful consideration should be used before this udgment is pronounced; what a multitude of sensations must be conidered, on all of which this judgment must be based!

The tongue, the cheeks, the gums, the anterior and posterior palates, he larynx, the nasal cavities, and to a certain extent the stomach, all ontribute their separate sensations, which must all be taken into ccount. Besides these, the taster has also the sensations received by he eye and the nose. With all this varied testimony to consider, he hould reflect deeply before delivering his verdict. For this reason, the aster, during the tasting and the few moments following, truly solemn noments, should be completely undisturbed by noise or otherwise.

A taster can sometimes conveniently express his verdict of quality by neans of numbers; usually those from 1 to 10 are used, and correspond o the following expressions:

10—Perfect.
9—Almost perfect.
8—Quite good.
7—Relatively good.
6—Fair; sound, but not harmonious.

From 5 to 0 indicate various defects, according to their gravity.

III.

QUALITIES AND DEFECTS OF WINES.

The art of wine tasting, like every art or science, has a language of its own, without which the taster could not properly express his criticisms, nor compare his opinions with those of other tasters regarding the same wine.

This renders it necessary to define or explain the various terms that have been adopted by tasters to express the sensations experienced by their senses of sight, smell, and taste, during the examination of a wine.

FOAM (*Spuma*, It.; *Mousse*, Fr.).—When a wine is poured from one vessel to another, or agitated in any way, there forms a more or less abundant foam; that is, at the surface of the wine there are formed in greater or less quantities collections of little gaseous bubbles.

FINE FOAM (*Spuma di grana fine*, It.; *Mousse à perles fines*, Fr.).—The foam due to the formation of very small bubbles.

COARSE FOAM (*Spuma di grana grossa*, It.; *Mousse à grosses perles*, Fr.).—When the bubbles are larger.

EVANESCENT FOAM (*Spuma evanescente*, It.; *Mousse évanouissante*, Fr.).—Said of that which disappears immediately, or almost as soon as formed. As the old saying has it: "*Vino che brucia la spuma*" (a wine that consumes its foam).

PERSISTENT FOAM (*Spuma persistente*, It.; *Mousse persistante*, Fr.).—When the foam lasts some time and disappears slowly.

Persistent foam, as a rule, is characteristic of a wine poor in alcohol; of a wine at a low temperature, or of a wine in need of racking, or, it may be, of a wine which is undergoing a slow fermentation, which may be either the normal and necessary alcoholic fermentation, or may be what is known as a secondary fermentation, in which case the wine is a prey to some malady—tartaric fermentation, for example.

The foam may also be persistent on account of effervescence, that is, the continued giving off of carbonic acid, which is dissolved in the wine, and which in escaping on the decrease of pressure forms little bubbles which renew the foam.

In the first cases cited above, the foam is usually limited to a more or less imperfect crown or ring of bubbles which form around the edge of the glass; or if the wine contains more than the usual amount of carbonic acid a bubble of gas will now and then be formed and rise to the surface.

When some disease is the cause of the persistent foam, especially if it be that known as "*subbollimento, cercone, or vino girato*" (*vin tourné* of the French), the circle formed is called "*unghia*" (nail), from which the expression "*il vino fa l'unghia nel bicchiere.*" [This disease of *turned* wine is due to the filiform ferment, which destroys the tartar of the wine.—*Trans.*]

In the last case, when the persistent foam is due to effervescence, which may be of various intensities, several distinctions are made, of which the following are the principal:

SHARP, PUNGENT (*Frizzante, Piccante, Wine which has the Pinzo*, It.; *ordant, Piquant*, Fr.).—In this case there is a somewhat abundant ving off of bubbles of carbonic acid when the wine is agitated, and en after, which tend to cling to the sides of the glass. Some one has ritten of a wine of this kind that "*nel berlo baciá e mordè*" (it kisses id bites); it makes itself felt as a smarting or pricking on the palate.

"*Sarà forse più frizzante*
Più razente e più piccante."—Redi.

This pricking is caused by the presence of a larger amount of carbonic id than is normal to the temperature and pressure.

The Tuscan usage of "governo" imparts this character to a wine.

"When the violent fermentation is over, throw in two handfuls of ied grapes to each vat; this will make the wine clearer and more quant."—Davanzati.

However, Polacci rightly says: "For us a wine *governato* is always a fective wine."

FOAMING (*Spumeggiante*, It.; *Écumant*, Fr.).—This is said of wines hich contain so much gas that when they are agitated bubbles are ven off copiously, enough to form a layer of foam over the whole sur- ce of the liquid. In the words of Redi:

"*Che nei vetri zampilla,*
Salta, spumeggia, e brilla."

Wines which are bottled young, before they are well defecated, or hich contain sugar when bottled, easily become "*spumeggiante*" when pt in a cool place.

SPARKLING (*Spumante, Mussante*, It.; *Mousseux*, Fr.).—This is said of nes which, after pouring into a glass, give off from every part an undant supply of bubbles of carbonic acid, or foam, which collects the surface and is continuously renewed for some time. The wine ibbles, and as is commonly said, pearls the surface.

In sparkling wines, the carbonic acid is in solution at a relatively gh pressure.

In these wines, after the first violent ebullition of gas, there is what known as the "*fontanella*," sparkling, which is due to a continuous velopment of very small bubbles of gas, which, starting from certain ints at the sides or bottom of the glass, rise like little chains of beads the surface, where they cause the phenomenon known as pearling.

Of sparkling wines there are three grades, based upon the amount of aming, or rather on the amount of carbonic acid which is given off, id in the length of time during which the foaming continues.* These ades are:

CREAMING, GENTLY SPARKLING (*Mezzo spumante*, It.; *Crèmant*, Fr.).— iese are wines in which only a slight layer of foam forms, and which ve off but a moderate amount of gas; that is, effervesce very slightly.

The pressure exerted by these wines on the interior of the bottles is ss than three atmospheres.

ORDINARY SPARKLING, OR MEDIUM PRESSURE (*Spumante, bella spuma*, .; *Mousseux ordinaires*, Fr.).—In these wines there is sufficient gas to use the foam to flow from the bottle the moment it is uncorked. The

*The French have a fourth grade, which they call Tissane, and which includes second id third-rate wines, which are, however, fairly drinkable.

pressure in this case varies from three to three and one half atmospheres.

Strongly Effervescent (*Molto spumante*, *Spuma forte*, It.; *Grand mousseux*, Fr.).—In these the cork is forcibly ejected from the bottle when unwired, and the wine is sufficiently charged with gas to be expelled from the bottle by its own pressure.

In these wines the pressure approaches or surpasses four atmospheres. The maximum pressure that bottles will stand, without great danger, is about six atmospheres.*

Either too low or too high a pressure is a serious defect in sparkling wines. If the pressure is too low they do not effervesce; if, on the other hand, the pressure is too great, as in the case of bottles which the French call "recouleuses," there is a ruinous percentage of broken bottles, or if the bottles do not burst the cork is driven out, and most of the wine lost.

The carbonic acid which is dissolved in these wines, is produced by the fermentation of added sugar, or of a portion of that which the must contained.

As already stated, wines which have been fermented dry, and not with a view of making them sparkling, can be rendered so afterwards by being charged, at a high pressure and low temperature, with carbonic acid. On this is based the system of Carpené, a system now much used both in Italy and abroad.

Sparkling wines may be:

Sweet (*Dolci*, It.; *Doux*, Fr.).—When the sweetness is decided and due to a large addition of syrup.

Dry (very slightly sweet) (*Semidolci*, *Dolcigni*, It.; *Douceâtres*, Fr.).—When the sweetness is slight or hardly noticeable.

Extra Dry (*Secchi*, *Asciutti*, It.; *Secs*, Fr.).—Which the English taste calls for; when there is no trace of a taste of sweetness.

In various red wines the foam may present different colors, as:

White (*Bianca*, It.; *Blanche*, Fr.).—The case usually with old wines. There are, also, in some localities, young red wines of which the foam is white or whitish.

Rose (*Rosea*, It.; *Rosée*, Fr.).—This is the case with lightly colored young wines, and is characteristic, it may be said, of mature wines.

Red, Ruby (*Rossa*, *Rossa rubino*, *Vermiglia*, It.; *Rouge*, *Vermeille*, Fr.). The color of the foam of heavy-bodied, deeply colored young wines.

Orange Red (*Rossa granato*, It.; *Rouge grenat*, Fr.).—This is a deep vinous red, resembling the color of pomegranates, and is often seen in cutting wines, or those blended with them.

Bluish (*Turchiniccia*, *Bleuastra*, It.; *Bleuâtre*, Fr.).—Seen in wines poor in acid; as in some cutting wines which possess only from 3 to 4 per cent in acid.

Bright, Clear (*Viva*, *Brillante*, *Smagliante*, It.; *Vive*, *Brillante*, Fr.). When the foam has a clear, crystalline appearance; this is generally seen in generous, young wines of full acidity.

Dull, Dead (*Poco viva*, *Morta*, It.; *Morte*, Fr.).—The opposite of the

*As a rule, authors give higher figures for the pressure of the various kinds of champagne than I have indicated, but the fact is, that my figures, if not too low, are certainly not too high. Of this, I am assured by Professor Carpenè, who, in his experiments with sparkling wines, had occasion to test the pressures of many wines from the best accredited foreign and domestic houses.

going; indicates a diseased or decrepit wine, or one in need of king.

fter the foam is disposed of, the taster remarks on the degree of pidity which the wine presents; a wine is said to be:

LEAR (*Limpido*, It.; *Limpide*, Fr.).—When it is transparent and with- cloudiness; or what Columella calls "*vinum defaecatum quam lim- issimum.*"

BRIGHT, BRILLIANT (*Brillante, Diafano, Lucido, Smagliante*, It.; *Brillant, ide, Luisant*, Fr.).—These terms are used to express a perfect and, as vere, crystalline transparency. This is the condition of wines that e been well clarified or filtered.

t may be noted here that clarification, unlike filtration, slightly difies the composition of wine, as is proved by the quantitative deter- ation of Professor Carpené, relative to wines that had been treated h white of egg. Following are the results of these determinations:

	Tannin.	Œnocyanin.	Extractive Subtances.	Ash.
ne of 1873, unclarified	0.91	0.42	21.39	3.12
ne of 1873, clarified	0.41	0.24	19.91	3.06
ne of 1874, unclarified	1.15	0.82	24.22	2.80
ne of 1874, clarified	0.57	0.44	20.17	2.79

The quantity of albumen employed was about 100 c.c. per hectolitre per m., or 1 pint to 125 gallons), which is a usual dose.

LOUDY, DULL (*Vellato, Appannato*, It.; *Voilé*, Fr.).—This is said of es that are not quite clear, that show a slight cloud or dimness, due the presence in them of substances in suspense in a very fine state of division. This is noticed, for example, in wines recently racked, ecially when, during the operation, they have been much exposed to air and drawn into well-sulphured barrels.

This slight defect, which is easily cured, is also frequently found in es made from grapes grown on rich soil, and also in wines which, ng poor in acid, have not undergone a complete fermentation.

Wines, of course, may possess different degrees of cloudiness, which generally expressed by the terms cloudy, slightly cloudy, nearly ar, etc.

TURBID, MURKY, THICK (*Torbido*, It.; *Trouble, Cassé*, Fr.).—When the spended particles are large enough to be almost visible to the naked e, and present in sufficient quantity to completely destroy the trans- rency of the wine and make it almost opaque.*

Old bottled wines may be turbid either because they nave become unsound, as hap- ns very easily when bottled too young, or because they have not been thoroughly ecated before being bottled, or it may be, because they have been moved in such a nner as to stir up the slight deposit which all wines throw down in time in greater or quantities. If the wine is unsound there is no need of precautions, for the wine become undrinkable; if, on the contrary, the turbid wine is sound it must be moved h the greatest caution, and to prepare it for the table it will be found useful to follow rules of C. Ladrey, who writes thus:

"When the time arrives to drink a wine which has lain in bottle for some years, the t thing to do is to examine the bottle with great care when it is lifted up. It should lifted up cautiously, retaining it in its horizontal position. By carrying the wine o the light, daylight or artificial, it is easy to ascertain whether the wine is perfectly ar or has a deposit. If, as may happen, the wine be perfectly clear, without trace of posit, the bottle may be stood up and the wine served from it without decantation. is case, however, is very rare, and, especially with old wines, there is generally a deposit.

A wine from low-land grapes, in which tartaric fermentation has reached the stage of development when carbonic acid begins to be freely given off, is a good example of this condition.

This defect may be simply transitory, as when a wine has lately received some treatment, or an addition of alcohol or tartaric acid, or directly after cutting or mixing wines, or when a wine has been much shaken or been exposed to too low a temperature. If the defect is permanent, it shows that the wine is diseased or ready to become so, or that the wine has been badly made. In the former cases the wine simply needs time to depose or an increase of temperature, when it will right itself. In the latter cases some special treatment is necessary, such as sulphuring, addition of tartaric acid, clarification, pasteurizing, etc.

Opalescent, Iridescent (*Cangiante*, *Opalescente*, *Iridiscente*, It.; *Chatoyant*, Fr.).—When the light in passing through the wine is decomposed, that is, when in looking through the wine rays of different colors are seen. This iridescence is best seen at the surface of the liquid and near where it is in contact with the glass; it is due, not to reflection or refraction, but to the phenomenon of interference.

A wine exhibiting this peculiarity is open to grave suspicion of unsoundness, if it is not already in an advanced stage of disease.

As an example of a wine in this condition, may be cited one which is, in the first phases of the disease, known as "subbollimento."* If a little of this wine is left exposed to the air it first becomes turbid, and loses its red color; then a precipitate forms and leaves a yellowish, sour, somewhat bitter liquid on top. As the disease progresses, if the wine is slightly shaken, mucous clouds will be seen floating in it, at the surfaces of which the above-mentioned phenomenon of interference may be seen.

In the time of Pliny, to describe the color of a wine they had only the four following epithets: *album*, *fulvum*, *sanguineum*, *nigrum*.

In those days they were easily satisfied; now we use the following terms to describe the colors of red and white wines:

Colorless, Decolorized (*Incolore*, *Scolorito*, *Decolorato*, It.; *Incolore*, *Decoloré*, Fr.).—When the wine has almost the appearance of pure water; when the rays of light pass through it without suffering any or only imperceptible changes.

Colorless wines are easily obtained from perfectly ripe white grapes, picked and handled with great care, and crushed when quite fresh and quite cool; then by exercising the most scrupulous cleanliness during the vinification and keeping of the wine, and by fermenting the must after it has been well defecated. If a wine is made which is not per-

In this case we must be careful not to mix the limpid part of the wine with the deposit, and before raising the bottle up the wine should be decanted, which in its result is an operation exactly similar to racking. This decantation should be made in the cellar, and demands some precautions. First the neck of the bottle is carefully raised, but not too high; it is then uncorked, care being taken not to subject it to any brusque motion either in raising it or in drawing the cork. The wine is then poured into another perfectly clean bottle, taking care to stop before the smallest part of the deposit has passed into the fresh bottle or decanter. The quantity of wine lost by this method is very small, and the wine that is saved can be drunk to the last drop. If, on the contrary, a wine which has only a very slight deposit is placed on the table without decanting, the second or third glass will commence to show a loss of brightness and the wine will have lost its agreeableness. There are some very simple machines made, which work on the principle of the siphon, and which greatly facilitate the operation of decantation."

*"La pousse" of the French, a kind of tartaric fermentation which is fully described on a subsequent page.—*Trans.*

fectly colorless, it may be rendered so by the use of animal charcoal, properly prepared, that is to say, in such a way as to prevent its diminishing the acidity of the wine. If this precaution is not taken, the wine, on account of its diminished acidity, will quickly turn yellowish on account of the formation of ferric compounds, which, under these conditions, takes place with great readiness.

STRAW-COLORED (*Paglierino*, It.; *Couleur de paille*, Fr.).—Of the color of straw, but somewhat pale.

AMBER, YELLOW (*Giallo*, It.; *Jaune*, Fr.).—Is said of wines which have a deeper straw color.*

GOLDEN, GOLDEN-YELLOW (*Giallo dorato*, *Aurato*, *Dorato*, It.; *Doré*, Fr.).—This epithet sufficiently explains itself.

"*Egli è il vero oro potabile*," wrote Redi of the wine of Trebbiano.

GREENISH (*Verdognolo*, *Verdiccio*, It.; *Verdâtre*, Fr.).—When a wine has a slight greenish tint, resembling somewhat the green of grass. This color is characteristic of certain varieties of grapes; for example, the Verdea or Bergo.

Regarding the wine of this variety, it is said that the Verdea of Tuscany is not so called on account of its green taste, but because of its greenish tint.

Frederick the Great, of Prussia, had a great predilection for the wine of Verdea.

This greenish color is also characteristic of the wines of Reno, and in general of wines made from somewhat acid grapes.

PINKISH-YELLOW, OR PINKISH STRAW-COLOR (*Paglierino rossastro*, *Giallo rossastro*, It.; *Paille roussâtre*, Fr.).—Sometimes a wine, in addition to

*This yellow color may be natural and proper to the wine, or it may be a color which it has acquired from several causes, among which are some that have very grievous effects on the wine, and may be considered properly as maladies.

The wines most generally subject to this disease of becoming yellow are those poor in alcohol, tartar, tartaric acid, and tannin, and which on the other hand are rich in malic acid.

I have already alluded to one of these causes above, namely, the presence of iron compounds. Some colorless wines, which are rather poor in acid, become, when placed in contact with the air, yellow or yellowish brown, in consequence of the formation of complex compounds, ferric, humic, etc.

The commonest causes of the yellowing of wines can be traced to the conditions under which the vintage has taken place; if, for instance, the season has been cold and rainy, and the grapes have been gathered after the vines have in great part been denuded of their foliage, if the bunches contain decayed, soft, insipid grapes poor in acid and sugar, a wine of poor keeping qualities is obtained, and one very likely to become yellow, unless art comes to the aid of nature.

Robinet, who has made special investigations with regard to the causes of this deterioration of white wines, distinguishes between that due to a fermentation caused by a mycoderm, and those due to chemical action, and among the latter he mentions some which give rise to the formation of malic ether, which reacts on the sugar. I should, however, remark here that after stating his belief in the formation of the malic ether, he declares that he has been unable to find the rational equation of the reaction, or definite proof of its existence, but bases his belief in the formation of the malic ether on the taste and pronounced odor of cider which the wine acquires—an odor which is characteristic of the above substance.

Robinet also makes the important observation that during his researches he had noticed the disappearance of the glycerine from wines which were becoming yellow. This disappearance of the glycerine would lead one to believe that the reactions which take place are much more complicated than supposed by Robinet, especially in consideration of the fact that the glycerine is subject to transformations, like the other ingredients of wine.

Instead of trying to cure or ameliorate this defect in wines, it should be prevented, which can be done by the addition of alcohol and acids.

The secondary fermentation which causes this disease is due, still according to Robinet, to a particular mycoderm, which can be seen distinctly with a magnifying power of nine hundred diameters. This mycoderm is extremely small, and of an oblong shape; it is $\frac{1}{300}$ m.m. in length, and $\frac{1}{900}$ m.m. in width.

its yellow or straw color, will have a pinkish tint of more or less intensity. This may be considered as due to imperfect cleanliness of the vessels used in wine making, or of the barrels in which the wine has been put.

ROSE-COLORED, SHILLER (*Rosato*, It.; *Rosé*, Fr.).—White wines made from red grapes frequently possess this color in greater or less degree; especially is this the case when the grapes have not been picked and handled with great care, or when the grapes have become the least heated.

A white wine may also acquire this color by contact with barrels or utensils which have been used for red wine and not been thoroughly cleansed afterwards.

This color is sometimes produced artificially. In France they use extensively *teinte de Fismes*, so called after the town in which it is manufactured. It is claimed that it is free from alum and sulphuric acid,* but wrongly.

White wines which have commenced to spoil, or in which viscous fermentation has started, and which begin to become brownish, or even bluish, and at the same time turbid, what the French call *vin oeil de perdrix*, are rendered salable by the use of this *teinte de Fismes*, and are sold by the French under the name of *vins rosés*.

Jacquesson, *père*, states that this coloring fluid not only colors and clarifies the wine, but also arrests the progress of the disease, or prevents it if it is to be feared. This fluid is also used in France for coloring sparkling wines.

BLUISH-BROWN, BROWN, YELLOW (*Bruno-bleuastro*, *Giallo-bruno*, It.; *Brun-bleuâtre*, Fr.).—This color, which the French call *oeil de perdrix* (partridge-eye), is a dull, dark yellow, proper to some old, southern wines, but due in the majority of cases in which it is found to some malady of the wine.†

This phenomenon is observed not only in old but also in young wines, both red and white. Very probably its origin lies in several causes, as the numerous explications given by different authors would lead us to believe. Nessler has studied the change of color as it takes place in white wines. He tells us that the substances that cause the coloration, more or less deep, of the wine are contained in the stems and the seeds. Thus, wines which have been fermented in contact with the solid part of the grapes blacken very easily when exposed to the air. The presence of bad grapes in the fermentation also tends to render a wine liable to this discoloration.

This change of white wine depends directly on the action of the air;

* The *vin*, or *teinte de Fismes*, was first prepared by Manceau by boiling elderberries and cream of tartar together.

† It sometimes happens, writes Robinet, that a perfectly bright white wine which has never been racked or otherwise treated before, is racked from its lees and treated with tannin and some clarifying material; then instead of becoming bright and clear the operations to which it has been treated have had diametrically the opposite effect. The wine has not taken the clarification, as the cellarmen say, has a bluish tint, and is turbid.

This change or malady of the "blue color" happens most generally in wines of low acid and alcoholic contents, and which are at the same time rich in nitrogenous substances. According to Robinet this malady is due to a secondary fermentation, caused by a mycoderm which is analogous to the *mycoderma crocceum*, and has a very ephemeral existence.

To cure this disease in a wine it generally suffices to raise the alcoholic strength, or sometimes an addition of six or eight grains of tannin per hectolitre is necessary. In the latter case the wine is allowed to settle for twenty-four hours after the addition of tannin, and then clarified with isinglass.

The above mycoderm is killed and precipitated by cold.

the wine loses its limpidity, becomes cloudy, and a black precipitate is formed; meanwhile the taste of the wine often changes. The black substance may be decolorized by sulphurous acid; the use of this substance arrests or retards the blackening of the wine.

Wines made from grapes poor in tartaric, malic acid, etc., like those which have been gathered when wet with dew or rain, or those which have been injured by cryptogams, are liable, when exposed to the air, to become cloudy and dark in color.

The presence of an excess of iron in the white wines of certain localities of the southern provinces is the reason why, when they are at all exposed to the air, their color changes to a blackish green.

Not southern wines alone, but also those from northern provinces, when they do not contain a sufficient quantity of acid, and more especially of tartaric acid, acquire this color. Chemists explain this phenomenon in different ways, though all admit that it is due to the presence of some of the compounds of iron. Nessler tells us that wines produced on soils rich in the salts of iron, and even wines which have been for any length of time in contact with iron, as happens when there is an iron rod between the heads of the cask, or when there are nails in the cask, etc., if they become exposed to the air, turn black, for then the protoxide or ferrous oxide contained in the wine changes in contact with the air to sesquioxide or ferric oxide. A black compound is then formed by the combination of the ferric oxide with the tannin; this black color is not obtained with the protoxide. Other chemists explain the phenomenon by supposing that there occur or are formed in the wine certain humic products analogous to those which are formed by the decomposition of vegetable substances. These substances are feebly acid, and have a considerable dissolving power on the iron. Thus there are formed in the wine certain of the lower compounds of iron, which, on exposure to the air, change to the higher compounds, and give the wine the blackish tint before spoken of. The wine then becomes turbid, and the flavor undergoes certain peculiar changes.

Formerly some sparkling wines were made of this color, but now it is no longer found but as a defect.

DIRTY (*Sporco*, It.; *Terne*, Fr.).—A diseased, badly made, or badly kept wine sometimes becomes turbid, and its natural color is masked by other colors, giving the impression of something soiled or dirty.

Among red wines the following are the colors most generally recognized; they may be of more or less intensity:

VERY LIGHT RED (*Claretto*, *Chiarello*, *Chiaretto*, It.; *Clairet*, Fr.).—These terms are used to describe a class of wines which contain the least color of any red wines; the cause of this poverty of color may be in the nature of the grape, the mode of preparation, or it may be that the wine has been diluted with water.

These wines form the connecting link between white and red wines.

Trinci, writing of these wines, says: "The French 'claretto' is a smooth, vinous, lightly colored wine, with little aroma; slow and long in maturing, and not pleasing when drunk alone; blended, however, in proper proportion, it is extremely good."

The "claretto" drunk by Redi, however, must have been very different from this, or he would not have written:

"*Benedetto*
Quel claretto
Che si spilla in Avignone."

Ruby (*Rubino*, It.; *Rubis*, Fr.).—Wines which have a fine, vinous red, which recalls the color of the ruby.

This color is that found most commonly in table wines; for instance, the wine of Chianti; it is also the color of the wines of Bordeaux.

Some writers speak of vermilion wines, but a wine is never really of that tint; wines rich in acid and of bright, intense ruby, will appear for the moment to be vermilion immediately after being racked, on account of the presence of a slight cloudiness.

Purple (*Porporino*, It.; *Pourpré*, Fr.).—The case where the natural red of wine tends slightly to violet.

This color is seen in Montepulciano when it has reached perfection.

Garnet, Red (*Granato*, *Rosso cupo*, It.; *Rouge sombre*, Fr.).—Said of wines which have a more or less intense blood-red, recalling the color of garnets and similar precious stones, and of some varieties of gooseberries, etc.

This garnet tint is seen in heavy-bodied dinner wines, such as Barbera, Gattinara, Borgogna, and in wines made from grapes grown on clayey and ferruginous soils. These wines in aging are apt to acquire more or less of the orange tint.

Black (*Nero*, It.; *Noir*, Fr.).—This color, the *nigrum* of the Romans, is really never found in wine; the darkest wines, made from the Teinturiers, are not quite black, nor is even the concentrated solution of œnocyanin obtained by the Carpené-Comboni process.

Violet, Bluish (*Violaceo*, *Turchiniccio*, *Bleauastro*, It.; *Bleauâtre*, *Violacé*, Fr.).—This color is seen in a more or less marked degree in blending and other wines poor in acid. This tint is due to the violet coloring matter which is contained in certain dark wines of southern Italy. It is very unstable, and precipitates with great readiness. It is also found in the wines from certain American coloring grapes, such as the Jacquez, the Marion, and York's Madeira, when they have been made without addition of plaster or tartaric acid.

Orange, Yellowish-Red, Rusty (*Aranciato*, *Giallo aranciato*, *Color matone*, *Rossico*, It.; *Orangé*, *Pelure d'oignon*, Fr.).—These are the colors or tints of old or decrepit wines. By decrepit wines should be understood wines which have passed their prime and have begun to lose their valuable qualities.

These tints are seen sometimes in young wines, but less marked than in old; especially in those which, at first, have much of the bluish tint, and which deposit their color quickly.

Old wines often lose all, or nearly all, of their color, and become what is called "scolorito," decolorized or faded.

Dark Colored (*Colorato*, It.; *Coloré*, Fr.).—Said of wines that have relatively a great deal of color.

Wines may be divided according to intensity of color into deep-colored, medium-colored, and light-colored wines.

Deep-colored wines are harsh and indigestible.

I will now pass in review the qualities and defects of which the senses of taste and smell take cognizance.

Aroma (*Aroma*, It.; *Arôme*, Fr.).—By aroma must not be understood simply those odors which are delicate and agreeable, as when speaking of bouquet; for example, the foxy odor or aroma of certain American

grapes, varieties of the species *Vitis labrusca*, and of the wine made from them, is far from agreeable.

The aroma is the odor which comes from the skins of aromatic grapes,* and varies in quantity and quality, according to the variety of grape and the degree of its maturity. It passes into the wine in wine making; the aroma therefore exists in the grapes as well as in the wine.

BOUQUET† (*Profumo*, It.; *Bouquet*, Fr.).—Every fine wine exhales an odor peculiar to itself, which is always delicate and pleasing. Exception may be made of artificial bouquets, which, if not absolutely disagreeable in themselves, are always too strong and intense in a wine.

The bouquet is due to the volatilization at ordinary temperature of certain substances known as ethers, which are formed by the reactions of the acids and alcohols in the wine during its process of aging.‡

Thus, the bouquet is not to be found ready formed in the grape, as is the case of the aroma.

SÈVE (*Abboccato*, It.; *Sève*, Fr.; *Göhr*, Ger.).—The "sève" is neither bouquet nor aroma; it is a certain savor, a certain fragrant quality of the wine due to a smooth and delicate blending, of perfections of aromas and bouquets, which is perceived when the wine is in the mouth and in the act of swallowing, affecting the olfactory organs through the internal nasal ducts. The bouquet and aroma affect the senses before, the sève after drinking the wine.

Carpené, writing of Moscato de Segesta, says: "Of the most delicate fragrance and exquisite flavor. It is a dainty, fruity wine, which fills the mouth with an harmonious ensemble of delicious flavors, which cannot be described, but can only be experienced."

Sève, which is especially the property of fine wines, is due to the presence of certain substances which are formed in the grapes during

*The ancients held aromatic wines in high estimation. They added to the must, during fermentation, different varieties of apples, then cane, amomum, cassia, saffron, ginger, and other species of aromas, to communicate the odor that they desired.

The aroma most highly appreciated was that obtained by the addition of myrrh. We read, in fact, in Pliny: *Lautissima apud priscos vina erant myrrhæ odore condita, ut adparet Plauti fabula, quae Persa iscribitur, quamquam in ea et calamos addi jubet.*

Peppered wine, which was prepared by fermenting the must with apples and pepper, was very much appreciated in the time of Pliny.

†Even the bouquet of wines has not escaped imitation and adulteration. The manufacture of artificial bouquets or perfumes for wines has become a regular industry in France and Germany, where it is carried on on a large scale. There is a large consumption of such articles as "bouquet" of Pomard, or of Bourgogne, extract of Bourdeaux, the "Rancio des vins," "sève" of Baumé, of Médoc, of St. Julien, of Champagne, of Sillery, etc.

The substances most usually employed to add an artificial bouquet to dinner wines, are: Florentine iris, raspberries, cloves, vine flowers, mignonette, nutmegs, bitter almonds, etc. To these should be added certain chemical products which are prepared more especially in Germany. All these attempts to imitate nature have been but very partially successful.

A wine may be perfumed artificially, but it is impossible to give it "sève." This artificial perfume is always too pronounced, and is never as delicate as the natural bouquet of wine. These artificial bouquets impress the sense of smell, but not that of taste. If a perfumed wine, then, is tasted without being smelled, its natural "sève" can be distinguished. Artificial aromas are not lasting, and gradually disappear from the wine.

‡Chemically, the difference between aroma and bouquet is, according to Maumené and Berthelot, the following:

The former is due to certain hydro-carbons and to the products of their oxidation; perhaps, also, as Ordonneau states, to the ether of a high, fatty acid produced by intercellular alcoholic fermentation, and which, being fixed, remains in the pellicle; this has enabled the experimenter to obtain it from the pomace of Folle Blanche.

The latter seems to be due to a mixture of aldehydes with one or more essential oils and of numerous ethers, the product of the combination of fatty and other polyatomic acids with ethylic and other alcohols; there are, for instance, valerian, amylic, propylacetic, etc.

the short time preceding their complete maturity; these substances are peculiar to certain varieties of grapes, and owe their existence also to careful cultivation, as well as to certain conditions of climate and soil.*

In analyzing wine, writes Fauré, I have observed that fine and delicate wines, those renowned for their flavor and general high quality, contain a certain glutinous, viscid substance, which exists only in almost inappreciable quantities in ordinary wines, and is quite absent from inferior ones.

This principle, to which wine owes its sève, has been called by Fauré œnanthin,† or flower of wine, and is only found in grapes which are completely mature. Some vineyards, which usually produce grapes containing this substance, fail to do so in stormy seasons. The only vines containing it in such years are those produced on dry sandy or gravelly soils. The same variety of vines, which, when grown on an appropriate soil, gives a wine full of sève, will, when grown on a rich, heavy, or clayey one, produce a wine containing little or no œnanthin.

Thus it can be seen that the preëminence of high-class wines is not due to the caprice of the taster, but to actual differences of composition, and to the presence of principles not found in inferior wines.

The ordinary wines of the three communes of the Gironde, where the four high-class Bordeaux wines are produced, are, in general, poor in œnanthin. These four wines, however, contain a larger quantity of the substance, as may be seen by the following:

Œnanthin contained in vines of—

High Class.		Ordinary.	
Chateaux Margaux	1.25	Margaux	0.70
Chateau Lafite	1.20	Pauillac	0.75
Chateau Latour	1.10	Pessac	0.50
Haut-Brion	.65		

FLAVOR (*Sapore*, It.; *Saveur*, Fr.).—In this character we have the effect of the wine on the sense of taste, and more particularly on the tongue, which best distinguishes between various tastes. The flavor is distinct from either aroma, bouquet, or "sève"; unlike the last, it does not affect the sense of smell. As has been shown, the sève is perceived after the wine has passed the base of the tongue, the soft palate; the taste, on the contrary, or better, the flavors, are perceived almost immediately, and continue to affect the tongue and its sides, or posterior

*The result of many observations and studies regarding the influence of soil composition or the character of wine, may be summed up as follows: High alcoholic strength is characteristic of wines grown on calcareous soils; color depends on the iron in the soil; smoothness on the alumina and on the variety of grape; bouquet on the silica.

Chambertin, writes Julian, is a wine which has a good color, much sève, is very delicate and smooth, faultless in taste, and possessing the most agreeable bouquet.

The vineyard which produces this wine has the following soil composition:

Alkaline salts	0.031
Carbonate of calcium and magnesium	4.425
Ferric oxide	2.961
Phosphoric acid	0.235
Alumina	2.063
Silica (soluble)	0.110
Organic matter	1.973
Insoluble residue (silica)	89.302

†By œnanthin should not be understood, as perhaps was done by Fauré, a single chemical compound, but rather a complex mixture of ethers.

portion, with a series of sensations which are agreeable or disagreeable, according to the nature of the flavors and their degree of intensity.*

NEUTRAL FLAVOR (*Sapore neutro*, It.; *Saveur neutre*, Fr.).—A wine is said to be neutral when it has no marked aroma or taste.†

Wines of neutral taste are the best base for the making of imitative wines, as they acquire most easily the taste of the wines with which they are blended.

VAPID, FLAT, INSIPID (*Insipido*, It.; *Plat*, Fr.).—A wine is vapid when it is lacking in alcohol and vinosity, or when, without having any defect

* With regard to tastes in general, writers are at variance. The greater or less number of tastes and the possibility of their classification have been discussed.

The number of tastes may be considered as infinite, and therefore a classification almost impossible. Such classification, however, has been attempted. Haller distinguishes twelve tastes, which have been reduced by Linnæus to ten: sweet, acrid, fatty, astringent, bitter, viscous, saltish, watery, and insipid.

Vintschgau proposes another taste—metallic.

Physiologists distinguish in the sense of taste four specific energies, that is, four elementary sensations, viz.: sweet, bitter, acid, and salt. The first two affect only the nerves of taste; the acid taste, on the other hand, if too strong, may cause pain, for which reason Vintschgau believed that acid and salt tastes affect also the sense of feeling, as is seen in touching concentrated solutions of acids.

Nothing is known with certainty as to the way in which different tastes are distinguished, and we must be content with supposing that each flavor—sweet, sour, bitter, salt—acts upon special nerves which serve to distinguish them. This is the more probable, as different parts of the tongue are unequally affected by different tastes. We are still more in the dark regarding the intimate nature of the tastes, the chemical composition of the substances which they characterize seeming to have no connection with them.

The chemical composition of a substance has nothing to do with its sweet, bitter, or salt taste; with regard to the acid taste, however, it may be said that every substance which tastes acid is also an acid from the chemical point of view.

† The vineyardist in making a choice of varieties to plant should keep in view the flavor which they will give to his wine. If he is planting in a new locality, where it cannot be known what kind of grape will there best develop its flavor, he should choose a variety which gives a wine of neutral taste.

The French, who are masters of the art of imitating wines, have this maxim: "There are more buyers than there are connoisseurs."

Trusting to the truth of this saying, they have been able to establish that great commerce of wine which has become one of the principal sources of riches to France. The cities of Cette, Bordeaux, Marseilles, Lunel, Montpellier, and others of the south of France are centers of the production of large quantities of "wines of imitation."

Do you wish to make, for example, a hectolitre of fine Bordeaux?

Take—

Red wine of the south (Roussillon or Narbonne)	60 litres.
White wine of good quality	25 litres.
Old wine of Alicante	12 litres.
Old wine of Malaga	3 litres.
"Conservatore enantico"	25 grammes.

The œnanthic conservative is dissolved in about a litre of warm white wine; the whole is then well mixed and allowed to stand for two weeks. During this time a slow, insensible fermentation goes on, which completely mixes or blends the ingredients.

The wine is then drawn into sulphured casks, clarified, racked again, and the Bordeaux is made.

This, however, is too expensive a Bordeaux; here is a cheaper one:

Red common Spanish wine	70 litres.
Wine of Narbonne	25 litres.
Wine of Malaga	5 litres.
Bordeaux extract	A quarter of a bottle.
Œnanthic conservative	30 grammes.

This is treated in the same way as the first.

If a still cheaper Bordeaux is desired—

Ordinary red wine	81 litres.
Roussillon and Narbonne	15 litres.
Old brandy	4 litres.
Bordeaux extract	A quarter of a bottle.
Œnanthic conservative	30 grammes.

The above information is for the edification of those who prefer a bottle of this Bordeaux to a bottle of Chianti, of Valpolicella, of Valtellina, and of many other Italian wines which are far superior to these French concoctions.

due to secondary fermentations, it lacks some of those qualities which together render a wine agreeable.

An insipid wine may have plenty of color, however. Insipid wines are very subject to unfavorable changes.

SAPID (*Sapido*, It.; *Sapide*, Fr.).—A wine is described as sapid; it is meant that the acids are agreeable in quality and proportionate in quantity.

VINOUS, VINOSITY* (*Vinoso*, *Vinosita*, It.; *Vineux*, *Vinosité*, Fr.).—A wine is said to possess vinosity when it imparts in a certain degree that sensation of warmth characteristic of the alcoholic flavor.

WEAK (*Debole*, *Vino che scappa in bocca*, It.; *Faible*, *peu alcoolique*, Fr.). A wine is said to be weak when it is of low alcoholic strength, or when its alcoholic contents are not in proportion to its other constituents. Wines of this character have in general little flavor, are insipid, and difficult to keep, on account of the gummy or mucilaginous substances which they contain, and to which they owe what little flavor they have.

LIGHT (*Leggero*, *Sottile*, It.; *Leger*, *Mince*, Fr.).—A light wine is one which is of good quality, but at the same time contains a relatively small amount of color, body, and alcohol, no prominent flavors, and no sweetness. The general effect of a light wine is one of delicacy, though there exists a just equilibrium between the various constituents.

SOFT, MILD (*Molle*, It.; *Mou*, Fr.).—A mild wine is one which does not affect the palate by its harshness or astringency, as do rougher wines. Softness characterizes wines which are neither sweet nor dry, and not too alcoholic.

ALCOHOLIC (*Alcoolico*, It.; *Alcoolique*, Fr.).—When a wine is spoken of as alcoholic, it is generally meant to be one containing a relatively high per cent of alcohol, but of an unsatisfactory and unsatisfying quality.

GENEROUS (*Generoso*, It.; *Genereux*, Fr.).—A generous wine is one with plenty of alcohol, but of a smooth, warming, strengthening character; one of which a small glass produces a feeling of well-being and sensible tonic effects.

WARM, HOT (*Caldo*, It.; *Chaud*, Fr.).—A hot wine is one containing a good deal of alcohol, which produces a somewhat burning sensation in the mouth and stomach.

SHARP, LIVELY (*Vivo*, It.; *Vif*, Fr.).—This is said of a wine which, without being pronouncedly acid or alcoholic, affects the palate vividly. It is a quality compatible with lightness, but not with smoothness.

FULLNESS, ROUNDNESS (*Stoffa*, It.; *Étoffe*, Fr.).—Expressive of a robust homogeneity, which gives the impression of solidity and good constitution.

BODY (*Corpo*, It.; *Corps*, Fr.).—A wine is heavy bodied when it is rich in extractive matter and has high vinosity.

HEADY (*Fumosa*, It.; *Fumeux*, Fr.).—Wines which contain much carbonic acid, and thus go quickly to the head, produce effects that are usually confounded with those of drunkenness, but which, in reality, differ very much from them physiologically. Wines of this character are unwholesome.

* Many use this word in a somewhat different sense; by it they mean "wine-like;" that is, having a full supply of the quality or qualities which preëminently distinguish wine from other alcoholic beverages.—*Trans.*

DENSE, PULPY (*Carnoso, Polputo, Maccherone*, It.; *Charnu, Pulpeux, Lourd*, Fr.).—Expressive of a wine that has what one might almost call a pasty consistency.

HEAVY, COARSE (*Grave, Gravone, Pesante, Capitoso*, It.; *Lourd, Gros, Pesant, Capiteux*, Fr.).—Wines which have much body and little alcohol, and which, even when drunk in small quantities, go to the head and weigh on the stomach.

CLEAN (*Franco*, It.; *Franc*, Fr.).—Said of a wine which does not leave the slightest suspicion of any taste indicating unsoundness, or of any defect due to the bad condition of the grapes from which it was made, or to neglect or improper handling of the wine.

HARMONIOUS (*Armonico*, It.; *Harmonique*, Fr.).—Well constituted. This is said of a wine when its constituents are in exactly the proper proportions, well balanced and blended, forming a perfect whole, which is at the same time pleasing and satisfactory.

WINE THAT ENDS WELL (*Vino che finisce bene*, It.; *Vin qui finit bien*, Fr.).—This is an expression used by the taster to define an impression that remains for a certain time after drinking a fine wine; it means a wine in which the constituents are harmonious, and remain so even after the wine has passed from the mouth, impressing the senses with nothing but pleasing sensations to the end. These sensations continue even after the wine has been swallowed, insomuch that one might almost say that it wished to prolong the pleasure of the drinker by a fresh visit to the organs of taste.

WINE THAT ENDS QUICKLY (*Vino che finisce presto*, It.; *Vin qui finit vite*, Fr.).—Wine that leaves but an ephemeral sensation in the mouth; that is to say, almost as soon as the wine is swallowed all trace of it is gone, and the palate, tongue, and stomach seek in vain to recall its character, flavor, bouquet—all have gone, all have disappeared.

WINE THAT ENDS BADLY (*Vino che finisce male*, It.; *Vin qui finit mal*, Fr.).—A wine that after swallowing leaves a disagreeable taste, bitter, woody, etc., in the mouth.

DELICATE (*Delicato*, It.; *Delicate*, Fr.).—A wine to be delicate must be perfectly harmonious, soft, and agreeable.

FINE, OR HIGH QUALITY (*Fino*, It.; *Fin*, Fr.).—A wine that unites a natural delicacy with an exceptionally agreeable flavor and delicious bouquet.

MUTE (*Muto*, It.; *Muet*, Fr.).—Said of unfermented or only partially fermented wines; they are characterized by a sweetish or gummy taste. They are wines which have been made from musts treated with sulphurous anhydride or fortified with alcohol. The wines that are generally made "mute" are white wines that are to be used to sweeten liquors or to increase the sugar contents of new wines, or that are to be used for the manufacture of syrups by concentration in vacuo.

When a wine is made mute by the use of sulphurous anhydride, the risk is run, if too much is used, of giving the wine, first, a taste of sulphhydric acid, and afterward more or less pronounced bad flavors due to the sulphates that are formed.

These wines are kept in cool cellars, where the temperature is as nearly as possible constant, and in strong and well-hooped casks. They ought to be clarified, preferably with gelatine. In order to obtain a perfect clarification, about 8 or 10 grammes of tannin are added to each

hectolitre before putting in the finings (one tenth per m., or about 1.25 ounces per 100 gallons).

SMOOTH (*Vellutato*, *Morbido*, It.; *Velouté*, *Moelleux*, Fr.).—A smooth wine fills the mouth with its grateful flavors and fagrance, imparting its delightful series of sensations without the slightest harshness.

This quality is due to the presence of a certain quantity of glycerine, and not to glucose, as at first one might be inclined to think. In this latter case the wine would be called "amabile" (fruity).

It is glycerine rather than glucose which gives a wine that kind of smoothness which might almost be called unctuosity.

In very high-class wines the smoothness or unctuosity is due not only to glycerine, but also to other bodies which have not yet been well studied; they occur more especially in wines of very favorable years; that is, of years when the season has been so propitious that the grapes have been able to attain an exceptionally perfect maturation.

Many chemists have attempted to determine the nature of these substances.

Il Fauré, who studied the wines of the Gironde, believes that this unctuosity is due to the same substance as sève, a substance which is of similar character to pectine and mucilage, and which he called "œnanthin."

Batilliat claims to have found in the high-class wines of Bordeaux the peculiar substance which causes their unctuosity, and which he calls "croatine."

Mülder, on the other hand, from observations made on the wines of the Gironde, considers this unctuous substance as analogous to dextrine.

Whatever may be the nature of this substance, it is useful to know that the wines in which it occurs, if not well kept, are liable to undergo an almost insensible fermentation, which destroys this substance, and so takes away from the wine that quality which is due to it; pasteurizing or heating will also deprive a wine of this quality.

FRUITY (*Amabile*, It.; *Suave*, Fr.; the Latin, *Suavis vel subdulcis*).—A wine which is very faintly sweet on account of retaining a small quantity of grape sugar or glucose.

As is said sometimes: "*Quel vinetto; cosi amabile va giù senza accorgersene.*"

Technically, a fruity wine cannot be said to possess sève because it tends towards sweetness. However, a wine which is very slightly sweet may possess a good sève in the sense that it produces those sensations which are the quality of wines of the highest class.

SWEETISH (*Dolcigno*, It.; *Doucereux*, Fr.).—A wine is said to be sweetish when its sweetness is undecided, unsatisfactory, and not in harmony with the other components of the wine; it is due usually to a bad fermentation and incomplete defecation, or it may be, with an ordinary table wine rich in mucilaginous substances, that it is becoming sick or undergoing one of those insensible fermentations, that is, the tartaric fermentation, to which such wines are so subject in the spring. In the latter case there is a moment when the wine can be detected in becoming slightly sweetish, and if prompt measures are not taken it will in a short time be completely spoiled. This turning flat and sweetish is due to the mucilaginous substances which, under the action of dilute acids and a favorable temperature, become transformed into substances resembling dextrine and other saccharine matters, which give place, or rather

favor, when the alcoholic fermentation has not been of a thorough character, the development of secondary fermentations.

SWEET (*Dolce*, It.; *Doux*, Fr.).—A sweet wine is one in which the sweetness is pleasant, because not excessive, and in harmony with the other principal ingredients, and more particularly with the alcoholic contents.

> "*Il vino dolce e glorioso*
> *Rende l'uomo pingue e carnoso*
> *E allargo lo stomaco.*"

OVER SWEET (*Dolciastro*, It.; *Douceâtre*, Fr.).—This is said of wines which are too sweet, or in which the sweetness does not seem to be well combined; that is, the sugar seems to have been lately dissolved in the wine.

HONEY SWEET, SICKLY SWEET (*Dolce smaccato*, *Melacchino*, It.; *Doux fade*, *Mielleux*, Fr.).—Of white wines when they are very sweet and of a nauseating sweetness, resembling must more than wine.

Melacchino is perhaps a corruption of *melichino*, meaning cider—*vinum ex malis*, *pomatium* of the Latins.

NEW OR YOUNG WINE (*Vino giovane*, *nuovo*, It.; *Vin jeune*, Fr.).—A wine which has been made but a short time, and which has not undergone those changes and transformations in its composition through which it acquires new qualities, due to the new substances which are formed, and which render it more agreeable to the palate, and in the case of fine wines impart bouquet and even sève.

Another cause of variation in the character of wines is the deposition in whole or in part of various substances on the walls of the cask, or in the form of lees at the bottom, that are thus eliminated from the composition of the wine.

These young wines, compared with their condition at maturity, are more heavy bodied, more deeply colored (green or acid), more astringent, and sometimes rough and harsh.

These wines are, finally, more nutritious than after they become mature; it must not be forgotten, however, that a wine which is too young is somewhat indigestible.

GREEN (*Verde*, *Verdetto*, *Bruschetto*, It.; *Vert*, *Aigrelet*, Fr.).—Green wine is not synonymous with young wine, as might be supposed at first; greenness is a quality which a new wine may and generally does have.

A wine is said to be green when it has an acidity and roughness which, though pronounced, is of such a character that it will disappear with time.

Thus, incompletely ripened grapes give a green wine, owing to a small quantity of volatile acid and acid salts which they contain, and more especially bi-tartrate of potash.

Greenness is characteristic of certain new wines, and also of many mature wines produced in northern countries.

TART (*Acidulo*, *Acidetto*, It.; *Acidule*, *Aigrelet*, Fr.).—Said of a wine possessing an agreeable and sufficient acidity, due to the presence of free tartaric acid and sometimes of carbonic acid, especially when this latter is in such amount as to become free easily, and so affect sensibly the tip of the tongue.

HARSHLY ACID (*Acerbo*, It.; *Acerbe*, Fr.).—Expresses a sharp, harsh acidity, like that in sour or unripe fruit, which puts the teeth on edge

and draws up the lips and mouth. This acidity comes from immature seeds or green stems, which communicate their acids, such as malic, racemic, etc., to the wine; in other words, the acid is the same chemically as that found in unripe fruit.*

Wine produced from grapes which for some cause or other have not reached their maturity, are always more or less harshly acid.

With time this repellant acidity disappears, for the reason, according to Dessaignes, that the malic acid, after eight or ten months, decomposes into succinic and butyric acids.†

MATURE WINE (*Vino maturo*, It.; *Vin mûr*, Fr.).—A mature wine is one which has quite developed all its characteristic qualities, and which is therefore ready to be drunk, or to be placed in bottles, where, in aging, it will go on improving.

DECREPIT WINE (*Vino decrepito, passato*, It.; *Vin passé, affiabli*, Fr.).—The caducity of a wine is the stage, according to Dr. Guyot, where it has passed its prime maturity, and when it has already commenced to deteriorate; when, in other words, it has lost some or all of the qualities due to its volatile principles and other constituents.

A decrepit wine has lost its fragrance, has become flat; it has not contracted any disagreeable or repelling flavor, for the taste of *age* that these wines have cannot be called disagreeable in the same sense as a wine which is attacked by the disease called *bitterness*, but it has a slight bitterness which recalls that of some resinous substances.

These wines, when they find themselves in favorable conditions, as when exposed to the air, decompose readily.

"A wine which has been exposed to the cold of winter and the heat of summer acquires in the month of September the taste which Italians call 'settembrino,' which is exhausted and 'passé.'"—M. Salvini.

DRY‡ (*Vino asciutto*, It.; *Vin sec*, Fr.).—This is said of a wine which leaves in the mouth a sense of dryness. It is a characteristic of highly alcoholic and somewhat astringent wines. "*Pomino* leaves the mouth dry," say the Tuscans. A dry wine is not only without even the slightest taste of glucose, but it does not contain, or only in the most minute degree, the quality of smoothness due to a certain quantity of glycerine, and, in the case of high-class wines, of other substances.

ASTRINGENT (*Aspretto*, It.; *Un peu âpre*, Fr.).—When the tannin is somewhat noticeable.

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*This acidity must not be confounded with that due to the acetification of the wine. This excessive acidity may be amended by an indirect method, which is that suggested by Gall, and which aims to correct the must before fermentation. Or some may have recourse to "marmorizzazione;" that is, the addition to the wine of powdered calcium carbonate (marble), which is, however, a method which cannot be very highly recommended, and when necessary, Liebig's method is much to be preferred. This method is to add to the wine a concentrated solution of neutral tartrate of potash in such proportion as to bring down the acidity to the desired degree.

As a preliminary test, to ascertain with an approximation near enough for practical purposes, several quart bottles are filled with the wine to be treated, and to each bottle is added a certain quantity of the solution of neutral tartrate of potash, each bottle being given a slightly greater dose than the one before. The bottles are then corked and left to themselves for a few days. They are then tasted, and the one giving the desired result is used as the basis of calculation for treating the whole quantity.

† The organic acids contained in the must are the following: Tartaric, racemic, malic, citric, tannic, palmitic, stearic, etc.

The acids, on the other hand, which are produced by fermentation, the oxidation of the alcohol, or the breaking up of the sugar, are: Carbonic, acetic, propionic, butyric, valerianic, capronic, œnanthilic, pelargonic, succinic, lactic, etc.

‡ This is a restricted use of the term *dry*, somewhat different from its more general meaning, which is simply *not sweet*, that is, containing no glucose.—*Trans.*

ROUGH (*Austero, Pavido, Allappante*, It.; *Austère, Âpre, Picotant*, Fr.).—These terms are used of wines which, on account of their excess of tannin, or rather œnotannin, are in the highest degree rough and astringent. Their flavor, which is somewhat nauseous, recalls immediately that of ink, or of ferruginous substances.

In drinking a rough, overastringent wine, a feeling of dryness is produced on the tongue and along the œsophagus. The daily use of wines of this character, by persons of delicate constitution, may occasion organic disorders.

This roughness tends to diminish with time, and may completely disappear; the cause being that the tannin, under the influence of oxygen, gives place to a slow formation of carbonic and gallic acids.

Œnotannin* possesses tonic properties, and insures the conservation of the wine by causing coagulation, and consequently the elimination of many substances which the wine contains, substances whose presence is dangerous from their instability, and because they favor the development of those organisms to which are due secondary fermentations.

High-class and fine wines when young, and even sometimes when old, are more or less markedly rough; this roughness they lose with time.

HARSH (*Duro*, It.; *Dur*, Fr.).—Harsh wines are generally young wines rich in tartar and tannin, and which, consequently, leave a repellant impression on the papillæ of the tongue and palate.

Harsh wines are lacking in delicacy and value.

Harshness, of itself, is a defect; ordinarily it is due to the soil, and in that case the wine is also heavy bodied. This defect may also be owing to unskillful preparation or handling.

Harsh wines keep easily, and can be kept for a longer or shorter time, according to their quality.

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*Œnotannin has the property of forming with gelatine and with albumen voluminous insoluble compounds, which precipitate with great readiness. By means of clarification, therefore, the contents of œnotannin can be notably diminished, thus curing, or at least considerably lessening, the defect of roughness.

I have called roughness a defect, but that should be understood relatively, not absolutely, for it should not be forgotten that the general trade demands a certain roughness, and wines in which it is lacking are often given this character artificially by the addition of alum, which is undeniably an adulteration, or by the addition of tannin.

Alum is used by unprincipled dealers, and has the quality of reviving the color, precipitating the albuminoids, and imparting a roughness, almost styptic, analogous to that presented by the common Bordeaux wines.

The wine maker has the choice of two kinds of tannin which are found in commerce, and which differ in their mode of extraction or preparation. Thus, the tannin may be extracted from galls by means of ether, giving a tannin pure, but retaining a taste of ether, which renders it objectionable in the treatment of wine. The other kind, which is extracted by alcohol, is inodorous, and therefore preferable for the wine maker.

Pure tannin dissolves completely in alcohol, and in water mixed with 10 per cent of alcohol, and the solution should be limpid. When the wine maker needs tannin he can make use of the grape seeds, which contain a considerable quantity; the seeds may be used either fresh or dry, the latter being more convenient, as they can be preserved from year to year.

It is to be remarked that clarification attempted with isinglass, gelatine, or white of egg, does not always succeed; the failure is due to the lack or insufficiency of tannin in the wine, or to its superabundance.

This explains the common usage of adding tannin to white wines before attempting to clarify them; or in the case of highly tannic red wines why, after adding the clarification, it is often necessary, in order to produce perfect limpidity, to have recourse to sulphuring and racking. This is what the cellarman means when he says that the wine has not taken the finings.

Wines which have fermented slowly, and which contain substances resembling humic compounds, can sometimes be fined even when lacking in tannin.

It is also worthy of remark that tannin has a great influence on the color of wine; it tends to increase it, and, according to M. Nessler, if the wine remains for some time in contact with the lees, it prevents, to a great extent, the diminution of the color.

The life of ordinary or common wines, which are harsh, is limited to a few, two or three, years. These wines in losing their harshness gain little or nothing in value, in fact, as they lose the defect of harshness, they acquire another, that due to tartaric fermentation.

Harsh wines which have good quality and body keep for a long time, and after some years lose their harshness; they thus become more homogeneous, harmonious, and pleasing, or as the experts express it, they become rounded.

If these wines are drunk before they have lost a portion of their harshness, they are not very hygienic.

Bitterish (*Amarognolo*, It.; *Un pen amer*, Fr.).—This is not a defect; it is even up to a certain point a good quality; that is, when the bitterness is very slight, delicate, aromatic, in short, pleasing; as a rule, a slight touch of bitterness is characteristic of densely colored wines.

Very often this quality is due to the presence of carbonic acid in solution; for example, in young wines or those which have been treated by the Italian method called "il governo."*

Sometimes, in the common language, all wines are called bitter, but with impropriety, which are not sweet; from which the Tuscan proverb, *Vino amaro tienlo caro*, which means, the wine which is not sweet is always of best quality.

Bitter (*Amaro*, It.; *Amère*, Fr.).—Bitterness is a defect, and may be due, as in general it is, to a real malady caused by a micro-organism.

"*L'amertume est pour nous la maladie organique des vins de Pinot.*"—Vergnette Lamotte.

Wines of this kind have a harsh, repelling, nauseating bitterness, due to secondary fermentations, or in the case of young wines, to principles which they have extracted from the skins or stalks during fermentation.

According to M. Nessler the tendency of a wine to this disease is augmented by remaining long in contact with the pomace.

The bitter taste affects principally the posterior portions of the tongue and palate, and the sensation persists for some time.

This fault, which most œnologists consider confined to red wine, is found also, we are told by M. Ottavi, in white wines. He claims to have encountered it in the white wines of Piedmont.

Nessler observes that white wines are less subject to this defect or malady than red, thus admitting, by implication, that they do sometimes become bitter.

The bitter secondary fermentation may develop in any wine, but is more frequent in fine and delicate wines. In common wines the disease usually occurring is the tartaric fermentation.

In general, highly colored wines, rich in extractive matters, are most liable to the attacks of the disease of bitterness.

The high-class wines of Bourgogne, made from the Pinot, not excluding even those made in the most favorable years, are subject to attack by this disease.

In the finest wines Vergnette Lamotte distinguishes two kinds of bitterness: That which attacks the wine during the first two or three years of its life, and which is the most dangerous; and that which shows itself

*"Il governo" is a method of wine treatment in common use in Tuscany, which consists essentially in maintaining a slow, protracted fermentation in a poor or neutral wine by the addition of half-dried grapes of high quality, or containing an abundance of those substances lacking in the wine treated, as color, body, tannin, etc.—*Trans.*

in old and decrepit wines. This second bitterness, due perhaps more to chemical reactions than to the action of ferments, is only relatively an ill, as the wine can be consumed before it reaches complete decrepitude.

Pasteur holds that even this second bitterness, which Vergnette Lamotte lays to the account of decrepitude, is caused by the same organism which determines the first kind.

This organism may remain inert for a longer or shorter period, till in the course of aging the wine presents the necessary favorable conditions for its development.

In conclusion, I will say that the bitter taste is a somewhat serious defect; a defect which may be more or less marked, as it may be transitory or permanent.*

* The bitter taste in wine may be the consequence of imperfect maturity of the grapes, owing either to an unpropitious season, or to the damage caused by insect or cryptogamic pests; or it may be the consequence of a secondary fermentation, caused by a micro-organism, *i. e.*, the "bitter ferment," which determines the formation of those substances which impart this taste to the wine. In the latter case we have a true disease.

When the bitterness is due to the principles which have passed from the grapes and stems into the wine, then with time and successive finings and rackings it will disappear. This is explained by the supposition that the nitrogenous substances become impregnated with the bitter principles, and thus, when the former are precipitated, they carry along with them the latter, the wine in this way losing this defect.

The bitter taste, if very pronounced, may not disappear after the first rackings, in which case the wine should be fined with gelatine or white of egg.

If the wine be weak, the coagulation of the albumen may be facilitated by the addition of alcohol.

According to the quality of the wine, it may be given a light clarification with the whites of three or four eggs per hectolitre, or a more energetic treatment with 25 grammes of gelatine.

Such a treatment not being found sufficient, recourse must be had to the use of olive oil of good quality; of this the dose to be used is one half litre per hectolitre. The oil is poured into the wine, the whole thoroughly stirred, and then allowed to rest; the oil separates from the wine, and carries with it the substances which have caused the bitterness.

Directly after racking a wine with access of air, it will sometimes become slightly bitter; this seems to be caused by the action of the oxygen of the air upon substances contained in the wine; later the bitterness disappears, owing very probably to the rapid oxidation which causes these substances to precipitate. In this way M. Mona explains how bitter wines in bottles can, with time, lose this defect.

Formerly various opinions were held regarding this malady, because, in all probability, people failed to distinguish between bitterness proper and the malady due to tartaric fermentation, or "la pousse."

Thus De Blassis attributed it to changes of the salts, especially of bi-tartrate of potash; Machard to an invisible action of the fermentative principle, decomposing the last remnants of sugar and salts in the wine; Lebœuf to an abnormal fermentation, which produced, sometimes, citric ether, which has a bitter taste; Vergnette Lamotte to a secondary fementation, caused by a parasitic vegetation, which decomposed the wine in consuming the coloring matter; Neubauer found that the quantity of tannin and of coloring matter diminished with the progress of the malady. Finally Pasteur, after the study of many bitter wines, has demonstrated that this malady is caused by the action of a micro-organism, which multiplies with extraordinary rapidity in the superior wines of the "Côte d'Or," but very slowly in the common wines of Bourgogne, the Jura, and the Bordelais. He adds that this malady presents many diversities in its development, according to the origin and the nature of the wine, but that all wines are subject to it.

Ducleaux, in 1873, determined the volatile acids of bitter wines, the following being the result of his analyses:

	Volatile Acid.	Total Acidity.	Acetic Acid.	Butyric Acid.
Sound wine	1.01 gr.	4.40 gr.	0.97 gr.	0.04 gr.
Bitter wine (1866)	1.50 gr.	5.15 gr.		
Bitter wine (1873)	1.95 gr.	6.67 gr.	1.83 gr.	0.19 gr.

The increase of total acidity in the sick wine being greater than could be accounted for by the formation of acetic acid at the expense of the alcohol, it must be attributed to the fermentation of the glycerine, which, in fact, had diminished.

EARTHY TASTE (*Terroso*, It.; *Terreux*, *Goût de terroir*, *Goût de pièrre à fusil*, Fr.).—By the term earthy a single definite taste must not be understood, but divers flavors which are all in general disgusting or bad.

In tasting, these flavors are perceived by the posterior part of the mouth, and may have their origin in the soil, in the use of inappropriate fertilizers, in the plants supporting the vines, or in the weeds infesting the vineyard, etc.

"The *earthy taste* is a vague term," writes Ottavi, and with justice, for it is a taste which is not always very definite, resembling sometimes earth, manure, flint, slate, nuts, willow, grass, etc. It is well known that Aristolochia, Mercurialis, etc., if allowed to grow in the vineyard, communicate their flavor to the grapes, and therefore to the wine. Pliny was not mistaken when he wrote: "In general, the vine takes up with an astonishing facility the flavors of neighboring plants. The grapes grown in the marshy soils of Padua have a taste of willow."

Generally the earthy taste is not found in high-class or fine wines. I say generally, because there are exceptions; for example, Chablis has a slight flavor of flint, and yet it is a wine of a certain renown.

Richelieu, speaking to Louis XV of a certain wine of Graves, said: "*Il sent la pièrre à fusil comme une veille carabine.*"

The *flinty taste*, writes Petit Lafitte, has something vinous and energetic, which exactly recalls the sensation experienced by the olfactory organs when a flint recently struck by the steel is held under the nose.*

The diminution of the glycerine was also pointed out by Pasteur, who, besides, stated that the tartaric acid did not diminish.

As the researches of Fritz have shown, many microbes are able to cause fermentation of the glycerine; thus, under the action of the *Bacillus butylicus* it is transformed into butylic alcohol and butyric acid.

Recently, B. Hass experimented with a view of ascertaining whether the bitter taste was due to citric ether, as Müller and other French chemists had supposed, or to some resinous substance produced by changes of the aldehyde in presence of ammoniacal compositions having their origin in the albuminoid matters of the wine.

By exhausting a wine which was afflicted with the *bitter* disease, and which he had previously rendered alkaline with ether, he obtained a resin slightly soluble in water, very soluble in alcohol and in acetic ether, insoluble in carbon bi-sulphide, turning brown in contact with the alcohols, becoming greenish with ferric chloride, and having the extremely bitter taste of the diseased wine.

Hass has found by his experiments that the best way of curing a wine afflicted with this malady, is by the use of oxidizing agents. Oxigenated water in small quantities is inefficacious; in larger quantities it destroys the bitter taste, but produces another not less disgusting. The best results have been obtained by aeration.

The wine is fortified by the addition of alcohol till it contains 13 per cent by volume, if of feeble character and liable to acetify. A current of air is then passed through the wine for two hours, and the bitterness disappears completely.

Filtration through pomace or cellulose has an excellent effect, the bitter substance seeming to be removed by physical attraction.

This disease may be said to have several stages. At first the wine is still clear, but less fragrant, duller in color, and with a slight bitter taste. Later it acquires an odor *sui generis;* the bitter taste increases, becoming piquant on account of the small quantity of carbonic acid produced by the secondary fermentation which takes place. Finally it loses its natural color, becoming brownish, with a tendency to blue; there has then taken place a serious change in one of the principal components of the wine—the extractive matter—and the wine has become an undrinkable liquid.

* According to Doussieux, the earthy taste is due probably to the solution and evaporation of a part of the mineral and metallic substances which are found in the soil of certain vineyards.

Petit Lafitte seems inclined to attribute the flinty taste to iron and alumina.

Ladrey, on the other hand, accounts for it by the presence of much silica in the soil, and many analyses show silica not only in the leaves and seeds of the vine, but also in the wine.

Joulie states that the flinty taste is due to the fact that pyroniac silica contains a bituminous substance of organic origin, the peculiar taste of which is communicated to the wine.

It should also be remembered that the experiments of Thenard prove that silicate of lime is much more soluble in water than was formerly believed.

According to the experiments made by Aubergier, the principle to which wines owe their earthy taste is found neither in the seeds nor in the stems, but in the skins of the grapes. From 15 kilogrammes of pomace he extracted 30 grammes of a volatile oil so acrid and penetrating that a single drop was sufficient to infect 10 litres of the best brandy.†

This fact supports the opinion of those who see in the prolonged contact of the wine with the pomace the cause of the earthy taste.

Certainly, by improving the soil, by the use of proper fertilizers, by a good defecation of the must, by a prompt removal of the wine from the pomace, by clarification and rackings, the taste under discussion is much diminished, and sometimes completely eliminated.

Taste of Soil (*Sa di terra*, It.; *Goût de terre*, Fr.).—When the wine has that taste of soil or of clay, due to the presence of soil in the must during fermentation. The soil in the must may come from the skins of the grapes, which may easily become covered with it when the bunches lie too close to the ground, or may have become mixed with the grapes accidentally or by carelessness.

This taste may come, also, from the clay which the peasants sometimes use as cement to close the leaks in tubs, vats, or other utensils.

Taste of Brine, Salt (*Sa di salmastro, di salso*, It.; *Goût de saumâtre, de salé*, Fr.).—The wine has sometimes the taste of common or culinary salt.

This defect is found in wines grown in soil rich in salt, or in localities near the sea.

Cooked Taste (*Sa di cotto*, It.; *Goût de cuit*, Fr.).—If the wine has a taste more or less pronounced of must or caramel, due generally to the action of fire upon the must when the latter has been concentrated carelessly, or by direct heat.

This taste is caused, also, by an over-maturity of the grapes, as happens in very hot weather, and especially when the grapes are thick-skinned; it may be caused, also, by frozen grapes, or by the freezing of the wine; in the latter case especially when the pieces of ice formed in the wine are not carefully removed.

Resinous Taste (*Sa di resina*, It.; *Goût de resine*, Fr.).—This taste is found in wines which have been kept in receptacles made of resinous wood.

Bread Taste (*Sa di pane*, It.; *Goût de pain*, Fr.).—Some sweet liquor wines have an agreeable taste which reminds one of the odor of fresh bread.

Taste of Drugs, Medicinal Taste (*Sa di droghe*, It.; *Goût de drogues*, Fr.).—A taste due to the addition of some infusion or drug to the wine.

Regarding the quantity of silica contained in wine, we have the analyses of Boussingault, who, in analyzing his wine grown at Smalzberg (Bas Rhin), found 6.096 gr. of silica per 1.870 gr. of ash in a gallon of wine, 5 per cent of the mineral ingredients.

Grasso, in the ash of four different musts, found the following quantities of silica:

Petit Bourgogne (not mature)	1.991 per cent.
Petit Bourgogne (mature)	2.099 per cent.
Petit Bourgogne (mature, but from a different soil)	1.191 per cent.
Grün Sylvaner (white, mature)	2.181 per cent.

In the skins the proportion was greater; in those of the first it was 3.464, and 2.571 in those of the fourth.

† That a drop of this oil is capable of infecting so large a quantity of brandy is not wonderful, when we reflect on the sensibility of our organism, especially of our sense of smell, which is so susceptible as to surpass the extremely delicate spectroscope. Thus, for example, Valentin has shown that one five hundred thousandth of a milligramme of sulph-hydric acid, or one two millionth of a milligramme of essence of roses, is sufficient to make an impression on our olfactory organs.

BURNT TASTE (*Sa d'abbruciato*, It.; *Goût de brûlé*, Fr.).—When the wine has a flavor of acrid fruit, together with a spurious cooked taste.

The taste of which we speak is a consequence of the partial withering of the grapes before their maturity, on account of extreme heat or of great changes of temperature between night and day.

MOUSEY TASTE (*Sa di topo*, It.; *Goût de souris*, Fr.).—A wine will sometimes have a disgusting flavor and odor that recalls forcibly the odor of the excrements of mice. The cause of this defect is not well known. According to some authorities, it is due to lack of cleanliness in the receptacles in which the wine is kept. Others believe it to be caused by the action of the oxygen of the air on the extractive matter of the wine, for there seems sometimes to be a distant analogy between the mousey taste and the fresh bread taste so much appreciated in some liquors. It is very probable that both of these causes concur to produce this taste, for it is found sometimes even in wines which have been kept in glass.

The mousey taste may be more or less intense, and wines affected produce a dry feeling in the mouth when they are tasted. If a wine has this taste in a very slight degree it is not noticed immediately; it often happens that after passing judgment on a wine, one's opinion has to be modified by a mousey taste which is not perceived at first. If the defect is pronounced, it is perceived immediately by the nose; the odor and taste too, in this case, are so disgusting as to be sickening.

HEATED TASTE (*Sa di riscaldato*, It.; *Goût de réchauffé*, Fr.).—This unpleasant flavor is hard to define, as, in fact, it is a mixture of various flavors—of acetic acid, of stems, of organic matter slightly decaying under the influence of heat and moisture, etc.

This taste is easily produced by allowing the cap to become overheated during fermentation, or by heating grapes before crushing them.

With time this taste tends to disappear, but when somewhat pronounced it diminishes, leaving the wine with a somewhat acrid taste.

SULPHUR SMELL, or better, SMELL OF SULPH-HYDRIC ACID.—An odor resembling rotten eggs which a wine may have, and which is due to the presence of sulph-hydric acid or suphuretted hydrogen.*

TASTE OF STALE EGGS (*Sa di uova stantìe*, It.; *Goût d'oeuf gaté*, Fr.).—This taste, which is easier to avoid than to cure, comes from the use of eggs not perfectly fresh for fining.

ODOR OF SULPHUROUS ACID, OR OF SULPHUR VAPOR.—A wine often has the odor characteristic of this substance when it has been recently racked into an excessively sulphured cask.

As every one knows, things that are useful when used in moderation become dangerous when used in excess. This is the case with sulphurous acid.

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* It is generally held that the cause of the formation of sulph-hydric acid in the wine is the presence of sulphur in the fermenting mass, as happens when the vines have been sulphured in such a way as to allow sulphur to adhere to the grapes. This is indeed the principal cause, but not the only one. Nessler cites six of these causes, which are: The sulphuring of the vines; the sulphuring of casks; the use of sulphur tape; the use of certain fertilizers; the cultivation of the vines in certain soils; the presence of iron in the vats or casks.

To these causes, most probably, should be added another, that of the reduction of sulphates by micro-organisms, a reduction first noticed by Planchud, who attributed it to vital action. This action has been found by Etard and Olivier to be due to algæ of the group of oscillators, called *Beggiatoa* (*B. roseo-persicina*, *B. mirabilis*, *B. alba*). Other algæ of the genus *Ulothrix* have the same property.

Is it not possible that micro-organisms might be found in wine resembling and acting in the same way as these algæ found in sulphurous waters?

The fine experiments of Dubœuf and J. Bruhl on the action of sulphurous anhydride, or acid, on micro-organisms, have an important bearing here.

They have deduced from their experiments the following conclusions:

1. Sulphurous acid gas has an evident microbicidal action on the germs contained in the air.
2. This action is especially perceptible when the air is saturated with water vapor.
3. Sulphurous acid acts particularly on the germs of bacteria.
4. Pure sulphurous acid will destroy germs, even in the dry state, if the action is sufficiently prolonged.

Sulphurous acid, when used in excessive quantities, takes away from the quality and color of the wine, and gives it a bitterish, astringent, and displeasing taste. In time the sulphurous acid changes to sulphuric, and then into sulphate of potassium. This is why in many wines is found a certain quantity of this sulphate, which is dangerous to health, and, when sufficient of it is present, would lead to the belief that the wine had been plastered.

At the end of the last century it was shown that a wine sulphured to excess acquired a very disagreeable odor, and was hurtful to the health, causing headache, vertigo, oppression of the stomach, nausea, etc.

In practice it is good to remember that the more alcoholic a wine the more sulphurous acid it will dissolve or absorb.

Nessler, making a comparison of water and wine at 9 per cent of alcohol, filled a barrel quickly with each, after having burned as much sulphur as the air in the barrel would consume, and found that the water absorbed .01035 per cent of sulphurous acid, and the wine .01346 per cent.

The quantity of sulphurous acid which a wine will absorb in process of keeping cannot be exactly stated, as it depends on the number of sulphurings, the amount of sulphur burned, or, when the sulphur is burned directly in the cask, on the amount of oxygen there.

According to Weigert the quantity of oxygen in a cask of one hectolitre is 21 litres or 30 grammes. By burning an equal quantity of sulphur 60 grammes of sulphurous acid are formed. When the cask is filled all this is not dissolved, because part is oxidized immediately, and part escapes into the air as the wine enters the cask; thus, the total amount absorbed by the wine is reduced to about 10 or 11 grammes.

VARIOUS ODORS (*Violet*, *Rose*, *Mignonette*, *Pink*, *Bitter Almonds*, *etc.*).—These are all odors given artificially to the wine to render it more fragrant, or to attempt to pass it off as a wine of higher quality than it really is.

Many high-class and fine wines, in aging, develop characteristic bouquets; but besides bouquet these wines have sève, which artificially perfumed wines lack altogether or have little of in proportion to their fragrance.

Besides the odors which we call good, which have been added artificially, we have also bad odors which are absorbed from the air by the grapes or the wine, such as the odor of tobacco, of grass, etc.

WOOD TASTE (*Sapor di legno*, *Asciutto*, *Sa di secco*, It.; *Saveur de bois*, *Seche*, *Goût de sec*, Fr.).—A taste not easily defined, as it lies somewhere between that of wood and of mold. It is communicated to the wine by ill-kept casks which have become "secco, asciutto," a defect seeming to

be due to the development of mold in the inside of the cask. Sometimes wine will acquire this taste when left long with ullage or in imperfectly closed casks.

To remove this taste recourse is had to olive oil, lemons, or refermentation with a small quantity of fresh grapes.

"*Se egli sappia di secco, il vino, vi abbia odor cattivo, caccinvisi dentro fiaccole acuse, e vi si spengano.*"—Soderini.

TASTE OF THE STEMS.—This is a rude, unpleasant taste, vulgarly known as a taste of "legno verde" (green wood). It is found in wines which have been allowed a too prolonged contact with the stems, or which have been made by a maceration of the whole bunch, or which have been made from bunches not perfectly sound. The taste of stems is generally accompanied by some bitterness.

Clarifications and rackings with contact of the air will often destroy or notably diminish the stem taste.

When it is desired to prolong the contact of the wine with the pomace, stemming is to be recommended.

SMOKY TASTE.—This taste resembles the smell of burning wet or green wood. It is, writes Mona, somewhat acrid and bitter, recalling smoke and soot. According to Mona, it is found more rarely in Italian wines than in German.

This defect may be occasioned by the smoke given off by ill-constructed stoves used to heat the fermenting-room or cellar; or it may be due to unfavorable climatic conditions during the vintage.

It has been stated that musts corrected by the addition of cane sugar will sometimes give wines with this taste.

With the smoky taste a wine loses its brightness, becomes cloudy, and if not cured by sulphuring, changes into a liquid not to be tolerated by even the most uncritical palate.

OAK TASTE.—A taste which a wine will contract after two or three rackings into new casks which have not been properly prepared, especially if they are made of a bad quality of wood. The wine in this case acquires a peculiar, bitterish taste, according to Ottavi, almost aromatic, much tannin, and often the real flavor of the wine is quite destroyed.

TASTE OF MERCAPTAN.—The repugnant taste and odor of onions or garlic, which remains even after the wine has been racked into well-sulphured casks.

The same causes which tend to produce hydrogen-sulphide in the wine, not excepting plastering when it is done heavily, tend also to form mercaptan. So far no means have been discovered of removing this taste from wine.

Polacci was the first to observe the formation of these products, which have a fetid and persistent odor, and are due to the action of sulph-hydric acid and sulphur on the components of the must and wine; he believes them to be simply ethylic mercaptan. Konig thinks that this reaction is not very probable, as it has never been known to take place in a dilute acid solution. He believes, on the contrary, that the aldehyde contained in most wines combines easily and directly in a dilute acid solution with sulph-hydric acid to form thio-aldehyde and trithio-aldehyde. Now these compounds are endowed with a strong, persistent, and disagreeable odor, resembling closely that acquired by wines containing sulph-hydric acid; it may be, therefore, that the mercaptanic

substance spoken of by Polacci is nothing but thio-aldehyde or trithio-aldehyde.

TASTE OF LEES.—Wine, by a prolonged contact with the lees, loses its clean taste and acquires a more or less pronounced bitterness, which has a distant resemblance to a taste of decay, and is characteristic of lees even when sound.*

TASTE OF DECAY (*Sapore di fradicio*, It.; *Saveur de pourri*, Fr.).—A taste which the wine contracts from unsound cooperage or too prolonged contact with the lees; it is a repelling taste of rottenness, which, however, must not be confounded with that caused by putrid fermentation of the wine.

This taste may also originate in imperfectly ripened grapes, which, through the prolonged action of dampness, have commenced to decay.

If the grapes are ripe before they commence to decay, the wine will still have something of this taste, but it will be less disgusting and will tend to disappear with time; the wine will, however, always be insipid, and lack frankness of taste.

MOLDY TASTE.—The characteristic taste of mold. Wines easily contract this taste, either from moldy casks or from moldy grapes having been used. It is generally possible to take away this taste by the use of olive oil.

Sapore di tempesta, It.; *Saveur de grêle*, Fr.—A harsh, bitterish, somewhat moldy taste, perceived in wine made from grapes that have been injured by hail at the commencement of their ripening.

RANCID (*Rancido*, It.; *Rance*, Fr.).—"When the wine is swallowed, or whilst it is being drunk, a displeasing taste is noticed in the throat and slightly on the palate, almost analogous to that of rancid substances, from which comes the name given to this disease of wine, till now unstudied by any author. The *rance* can also be smelt, if it is pronounced, but a good nose is needed to discover it, and a delicate palate to taste it, at its incipiency."—O. Ottavi.

FRUITY TASTE† (*Sapore di frutto*, It.; *Saveur de fruit*, Fr.).—Many young wines, when well made, have a very pronounced taste of fruit.

Common wines, with age, lose this taste, but fine, and above all, the finest, wines retain it, much to their advantage; they retain it, however, only when aged slowly, and without the use of artificial aids.

TARTARIC FERMENTATION.—This term is used to cover two different maladies of wine caused by two micro-organisms, which differ somewhat from each other, and the products of the fermentations caused by them differ considerably. These maladies, however, have a certain affinity, since both the micro-organisms, to whose action they are due, live at the expense of the tartaric acid in the cream of tartar.

The French distinguish these two maladies, calling the first "*la maladie de la pousse—vin poussé;*" in Italian, "*malattia del subbollimento;*" and the second, "*maladie de la tourne—vins tournés;*" in Italian, "*cercone.*"

* It may perhaps be useful to note that the lees may become the seat of a bacteroid fermentation independently of any anterior disease in the wine. Thus, according to the experiments of Ravizza, the wine and lees may become the prey of bacteria without the aid of molds or other micro-organisms that destroy the acids.

The temperature most favorable to the development of bacteria in the lees seems to be from 77° F. to 86° F. Below 77° F. the phenomena accompanying the life of these bacteria decrease, and towards 50° F. cease altogether. The practice, then, in racking, of separating the last layers of wine, that is, the part lying in contact with the lees, from the rest is a good one, and this wine may be considered of inferior quality, either because it lacks a clean, fresh taste, or because it is sometimes cloudy.

† Fruity is very often used in English with the inappropriate meaning of somewhat sweet.—*Trans.*

"*Maladie de la pousse.*"—This disease is recognized by the wine spurting out when the vessel in which it has been confined is opened; the wine exercises a strong pressure on the staves of the cask on account of the carbonic acid which is formed; it is from this that comes the term "pousse."

In the glass the wine shows a persistent ring of small gaseous bubbles of a whitish color. If the wine is left exposed to the air it becomes turbid; its color becomes dull with a tendency to yellowish.

The wine has lost its primary flavor, and as the disease progresses, becomes more and more insipid; if it is shaken there is an appearance of silky waves at the surface, caused by the lees which has risen up.

Balard was the first to show the presence in "vins poussés" of a ferment which, according to him, resembles the lactic ferment. He has further shown that in these wines the quantity of volatile acids is increased, the one found in largest quantity being acetic acid.

Bechamp and Sténard have shown that propionic acid is formed in these wines from the tartar and the glycerine. Nicklés, on the contrary, is of the opinion that metacetic acid is produced.

Duclaux, who has given much attention to this malady, seems to have proved: (1) That the amount of free acids augments with the progress of the malady; (2) that this increase is made at the expense of the fixed acids of the wine, particularly of the tartaric acid; (3) that the acids formed are propionic and acetic. After having shown this he concludes by saying that all fermentation of the tartar that takes place with the evolution of pure carbonic acid and production of propionic and acetic acids should be called "*maladie de la pousse.*"

Cercone, vin girato, mercuriella, It.; *Tourné, vin tourné, vin qui a donné le tour*, Fr.).—At this word in an Italian dictionary is written: *Cercone*—a distiller's term—is said of a spoiled wine, because in becoming thus it works and turns; *vappa, lora* of the Latins. The *lora* of the Latins is certainly not the *cercone*, but *family wine, piquette;* neither is *vappa*, since that, according to the dictionaries, should indicate a flat, vapid wine. *Vappa vinum insipidum et nullino virtutis, postquam omnino odor saporque optimus evaporavit.*

Vin tourné has this peculiarity, that when first poured out it appears sound, but after a short time it tends to become turbid and iridescent.

Under the influence of the oxygen of the air the coloring matter becomes purplish, and precipitates, and the wine acquires a yellowish tint, a sour taste, and a forbidding bitterness.

Wines of this kind when distilled give a brandy having a bitter taste, caused probably by ammoniacal compounds. The alcohol made from them has not always, but often, a strong and pungent odor, and cannot, without being well rectified, be put to the ordinary uses of wine alcohol, that is, the manufacture of vermouth, etc. This odor is sometimes so pungent as to bring tears to the eyes, and, by fractional distillations, it is possible to isolate a certain quantity of croton-aldehyde.* This compound is formed, very probably, during the distillation by the condensation of the aldehyde with diminution of water.

Balard has found lactic acid in "vins tournés;" Glenard, on the other

*Recently Professor Comboni, in distilling a wine made by blending Marzemino and Black Pinot, which had been attacked by the bitter fermentation, found in the distillate a considerable amount of aldehyde and formic acid. These products are certainly formed during the progress of the secondary fermentation, for they are not found at all in the same wine when sound.

hand, has found potassic acetate. In the secondary fermentation of "vins tournés," there is a formation of acetic acid, and more especially of lactic and tartronic acids.

A wine attacked by this disease may be considered as lost; however, at the start it may be useful to try the addition of tannin and cream of tartar, then pasteurization and fining. The disease, if not arrested, is followed by putrid fermentation.

PUTRID FERMENTATION.—This disease attacks the organic matter in the wine, destroys it, and gives rise to repulsive tastes and odors.

In the incipiency of this fermentation, the repulsive odor and taste are not very marked, and a cure may be attempted by heavy sulphuring, followed by filtration through charcoal, which acts as a disinfectant.

FAT (*Grasso*, It.; *Gras*, Fr.).—I will say now that this defect should not be confounded with that of viscosity or greasiness, though at first view it might be supposed to be the same in a moderated form.

The defect of "fatness" is rarely found in generous wines, but is usually confined to weak ones, and is not due, like "greasiness," to a fermentation, but to the presence of a certain amount of albuminoid substances, of gum, mucilage, imperfect sugars, etc., which impart to the wine a character which, when it is tasted, leaves a more or less marked impression of something glutinous; an impression which persists for some time, leaving, as it were, a pasty feeling in the mouth.

"Fat" wines are indigestible, and hard to keep during the hot season, as they are extremely liable to secondary fermentations. The wines in which this defect is usually found, are those grown on moist plains, which are naturally fertile, or made so by the addition of nitrogenous manures, as, for instance, young vineyards where the effect of manuring at the planting of the vines has not worn off.

This defect may be avoided entirely, or to a great extent, by a thorough and prolonged aeration of the must, or by the addition of alcohol or tannin* to the wine.

Sometimes this defect, when not too pronounced, will partly or wholly disappear after the wine has gone through its slow spring fermentation.

GREASY, VISCOUS (*Filante*, *Grassume*, It.; *Filante*, *Graisse*, Fr.).—Terms used of a wine which has lost part of its fluidity and which, when poured into a glass, falls without noise, or like oil; it has that viscid, mucilaginous look which reminds one of white of egg.

This malady is caused by a micro-organism. A greasy wine, as the malady progresses, loses its fragrance and becomes bitterish; its color becomes dull and tends to turn brown; finally, it loses its natural transparency and brightness. At first it is flat, vapid, and distasteful; and finally, rancid and sour by the formation of lactic acid.

*The addition of a little tanninized wine is better than the direct addition of tannin. Tanninized wine may be prepared thus: Take a small cask, holding, for example, about 25 gallons; fill it with a strong wine, or one made so by the addition of 1 or 1¼ gallons of alcohol of 94° C.; into the wine put about 35 pounds of grape seeds which have not been fermented. For the first few days the wine should be stirred from time to time, and then left to itself. After about ten days the liquid part is drawn off, and is then a wine heavily charged with tannin, which serves excellently for the purpose above noted; for that purpose a dose of 1 or 2 gallons of the tanninized wine to 100 of the wine to be treated is about the right proportion.

If a tanninized wine is needed for the defecation of the must, it is prepared thus: Take 5 gallons of alcohol and 10 gallons of wine, put in a small cask, and add about 18 or 20 pounds of seeds, and treat as in the former case; 1 or 2 gallons of this is sufficient to thoroughly defecate 100 gallons of must.

If fresh seeds are not to be had, dry ones may be used, providing they are in good condition, that is to say, providing they have been dried in the shade, kept in a dry place, and have not become moldy.

This malady occurs oftener in white than in red wines; in late years, however, it has been found often in red wines on account of the unfavorable conditions for the grapes attaining a complete maturity, such, for instance, as the damages done by insects, cryptogams, and bad weather. It occurs easily, too, in red wines made from grapes grown on very fertile soil rich in albuminoid substances.

Very probably this deterioration is much more complex than is usually supposed.

Peligot was the first to establish the presence of a micro-organism, of a bacterium. Pasteur, later, demonstrated that this bacterium has the property of transforming the sugar that remains in the wine into a mucilaginous or viscid substance.*

Béchamp calls the active ferment of this process *Micrococcus viscosus*, and the gum which is formed *viscosio*.

Tannin and alcohol, in certain proportions, prevent the development and action of this bacterium; the conclusion, therefore, is that wines poor in alcohol and tannin, and containing sugar, are subject, especially if white, to become "filant." This explains also the use of tannin, as proposed by M. François, of Chalons, to arrest or prevent this malady.

François attributes this malady to a peculiar nitrogenous substance, gliandin, a kind of glutin, which seems to have the property of being precipitated by tannin. Nessler affirms, however, that we do not know yet how the tannin acts.

I have already remarked on the complex nature of the malady under discussion. Usually it is held to be owing to a lack or deficiency of tannin. This, however, is not invariably true, since Francisco Selmi has found it in wine made from Lambrusca grapes, and therefore rich in tannin. It seems that in this malady the tartaric acid also suffers changes. Probably on account of these changes Bizzari proposes the use of tartaric acid, 200 to 250 grammes per 100 gallons, as a cure or preventive of the malady.

*The bacterium of "La Graisse" put into a solution of sugar containing albuminoid and mineral substances acts upon the sugar and transforms it into a kind of gum, mannite, water, and carbonic acid. Thus, 100 parts of cane sugar will give 50.09 parts of mannite, 43.5 of gum, besides water and carbonic acid.

Monoyer proposed to account for this transformation by two chemical equations, the first of which would give mannite and carbonic acid, the second gum and water, as formed from the glucose.

Schmidt-Mülheim is about of the same opinion, he believing that the viscous fermentation consisted of two processes, the first of which gave mannite and carbonic acid, and the second the viscid substance.

Kramer has studied this ferment. He examined three wines afflicted by it, and besides *Saccharomyces ellipsoideus*, *Saccharomyces mycoderma*, etc., he found an extremely minute bacillus 2 to 6 μ long, and .6 to .8 μ thick. He failed to cultivate this bacillus on potato, agar agar, etc., but by putting a little of the infected wine into a new (three months) white sterilized wine and with 3 per cent of glucose, he found that the bacillus developed well and rendered the wine "filant," but only when the air was completely excluded by covering the wine with a layer of oil. With access of air there was very little development of the bacillus, and instead an increase of the other ferments of the wine. Kramer has called this ferment *Bacillus viscus vini*.

The peculiar kind of gum produced by the viscous fermentation of the sugar renders the wine viscid and glutinous. In its properties it resembles dextrine more than it does gum arabic.

The viscid substance, according to Kramer, appears to be a product of assimilation of the organism, whilst the carbonic acid and mannite, which are formed contemporaneously, are products of the fermentation; a constant proportion between the first and the last substances does not exist.

The bacillus multiplies very well in its own viscid product.

The gum can be isolated and purified by precipitation with alcohol, dissolving the precipitation with water, and re-precipitating with alcohol. Dried at 100° C., it forms a brown, amorphous body, which in water, without being dissolved, swells up greatly and forms a kind of glue. It has no acid reaction.

The best means of preventing or arresting the disease consists of the use of tannin, pasteurizing to destroy the bacteria, racking into sulphured casks, and finally the addition of alcohol to the wine.

Pasteurization is inapplicable in the case of white wines which are destined for the fabrication of champagne, because it not only destroys the bacteria, but also the alcoholic ferments, whose action is necessary to produce the carbonic acid, which renders the wine sparkling.

At the beginning of the development of the disease, forcible agitation of the wine will restore its clearness and fluidity by the disassociation of the bacteria and the dispersion of the mucilaginous matter which envelops the parasite.

Agitation, however, must not be looked upon as a curative measure; the results obtained are only temporary, for the cause of the disease, viz.: the bacterium, is neither destroyed nor removed.

FLAT, WINE FLOWERS (*Vino svanito*, *Svaporato*, *Fiorito*, It.; *Vin evanoui*, *Évaporé*, *Fleuri*, Fr.).—A wine becomes flat when it remains for some time exposed to the air, as happens in an imperfectly filled or badly bunged cask. In time it becomes covered with "wine flowers," which consists of the *Saccharomyces vini*, or *Mycoderma vini*. In either case the wine gradually acquires an unpleasant, somewhat bitterish taste, and loses its strength and bouquet by evaporation, or else the breaking up of the alcohol into water and carbonic acid. This has been called by some one, on account of the products formed, hydro-carbonic fermentation, and is caused by the *Mycoderma vini*, which attacks not only the alcohol, but very probably the ethers, succinic acid, and glycerine, as these bodies tend to disappear.

Although cases do occur in which generous wines are attacked by the *Mycoderma vini*, still it has a decided preference for young and feeble wines. In old and well-defecated wines it develops with difficulty, perhaps because in these wines the elements necessary for its nourishment (nitrogenous bodies and phosphates) are not found.

The practice of some wine makers with regard to "wine flowers" is not in accord with that of those who follow a rational system of wine making. They consider only the development of the "flowers," which they look upon almost as a preservative of the wine, whilst the others sustain the necessity of energetically combatting and preventing the increase of the "flowers," because it is not only dangerous in itself, but is almost always accompanied by the *Mycoderma aceti*, or *Diplococcus aceti*, which, the moment circumstances become favorable, commence to replace the *Mycoderma vini* and cause the acetification of the wine.

When it is thoroughly understood how the "flowers" act it is easy to explain the facts put forward by those who do not consider it dangerous, and also the reasons of those who believe that it should be prevented by all means, and destroyed on its first appearance.

The presence of the "flowers" causes such an absorption of oxygen and development of heat and carbonic acid, as to prevent the growth of any other organism.

Ducleaux has calculated that 80 grammes of alcohol contained in a litre of wine of 10 per cent, needs for its transformation into water and carbonic acid more than 160 grammes, or 100 litres of oxygen.

The conclusions to be drawn from this are evident; they are, that when the cask is well closed, so as to prevent the free entry of air, the diminution of alcohol, caused by the "flowers," is reduced to a mere

trifle, and that the presence of the "flowers" excluded the action of other micro-organisms.

We must not, however, reason from this that the *Mycoderma vini* is really of use, for if exposure to the air should happen, if, instead of remaining white, the "flowers," as Pasteur noticed, should turn red, then, sooner or later, it will cede its place to other organisms, to the vinegar *diplococcus*, which, as I have shown before, is ready immediately to commence action, finding itself in favorable condition for its development, for the "flowers" itself serves for nutriment; and if there should be a considerable rise in temperature, the conditions are the best possible.

The final conclusion then, plainly is, that the "flowers" should be carefully guarded against; this is done by the strictest attention to "filling up," the importance of which was recognized by the poet Alemann, when he wrote:

Che nulla cosa
Può medicar il vin, che resta scemo.

The "flowers" may be destroyed by the addition of sulphurous anhydride or a few drops of alcohol.

With wine in bottles, the development of the "flowers" is prevented by keeping the bottles lying down; if instead the wine is kept in flasks ("*fiaschi*"), as in Tuscany, or in demijohns, a few drops of the purest olive oil on the surface of the wine will have the same effect.

SOUR, PRICKED, ACETIFIED (*Vino che ha preso il fuoco*, *Lo spunto*, *La punta*, *Il portore*, *Vino acetoso*, It.; *Vin qui a pris le fen*, *l'Aigre*, Fr.).—Acetic acid is one of the normal components of wine. It is formed during the alcoholic fermentation, but in such minute quantities as to be imperceptible to the taste. When the proportion of this acid, from one of the many known causes, becomes large enough as to be perceptible, then the wine is said to be "pricked."

A pricked wine retains its natural color and limpidity.

This defect is recognized by the odor and taste of acetic acid; in tasting, its strongest effect is perceived at the base of the tongue.

If a wine thus affected is not taken in hand immediately (and in truth success is not always sure) and treated with heavy sulphurings or pasteurizing, it soon becomes sour and acetic.

Acetification is due to the action of a micro-organism, the bacterium known under the name of *Diplococcus aceti*, still commonly called *Mycoderma aceti*, which increases with a rapidity truly prodigious. Duclеaux tells us that if on a surface of wine a metre square an almost imperceptible amount of these bacteria is allowed to fall, in twenty-four hours the whole surface of the liquid will be covered with a layer of them so closely placed as to be crowded into contact. Thus, there will be three hundred thousand million individuals formed in twenty-four hours.

The rapidity with which the acetic bacterium multiplies explains why a pricked wine, when the temperature is favorable, becomes so quickly completely acetified.

It should be remembered that whilst it is easy to prevent this disease by taking proper precautions in the fermenting-room and cellar, it is difficult, if not impossible, to destroy it when started.

Once a wine has become pricked, instead of trying to effect a cure, it is better to follow the advice of Guyot, who says:

"When wine acquires the odor and taste of acetic acid, it is sent to the vinegar factory, but it is never attempted to use it as wine."

All the means that have been suggested for the treatment of a pricked wine may be considered as palliatives only, and not as radical cures. In this regard Carpené writes very justly:

"The neutralization of the acetic acid, which has developed in the wine by the oxidation of the alcohol with potash, soda, lime, magnesia, and their simple or double neutral carbonates and tartrates, seems to be a rational method, but, in reality, is not so. These substances neutralize wholly, or in part, the free, and even the combined acids, and the diminution of the complex acidity of the wine renders the acetic taste less noticeable, but does not completely remove it. To remove entirely the acetic acid it is necessary to completely neutralize the wine, because the acetic acid combines with the alkaline and earthy-alkaline bases after they have neutralized the tartaric, malic, and succinic acids. Moreover, acetic acid, even when completely combined with a base, gives out, though less strongly, its characteristic odor, so that even after complete neutralization the wine will still have an odor of acetic acid, accompanied besides by a bitter taste, which lingers in the throat, and may be worse than the first fault."

MILK-SOUR, LACTIC ACID.—This, by inexperienced tasters, is easily confounded with pricking or acetification.

A milk-sour wine has a more disgusting, biting, and penetrating acidity than an acetic wine, a harsh acidity, whose effect is felt long after the wine is swallowed. An acetic wine has a noticeable odor of vinegar, whilst a milk-sour wine emits an odor of rancid butter, due to the butyric acid which almost always accompanies lactic acid.

If there is any doubt as to which acid the wine contains, the doubt can be solved by pouring a drop or two of the wine into the palm of one hand, and then rubbing it with the other; if any acetic acid is present its odor will be immediately perceptible on the hands.

A milk-sour wine loses some of its fluidity, and its color becomes dull.

Sweet, badly defecated wines, especially those rich in albuminoids, are liable to milk-sourness.

The disease appears during the winter or in the spring, and generally in wines poor in acids; it is accompanied by a turbidity of the wine and a change of color. As long as the wine remains in full, well-bunged casks, this turbidity and change of color do not occur, but only when it is exposed to the air.

Some observers have considered lactic acid as one of the normal products of alcoholic fermentation, like glycerine, succinic acid, etc.; the truth, however, is, as Pasteur has proved, that whenever the smallest quantity or trace of lactic acid is found in wine it is caused by lactic fermentation.

Whenever the alcoholic fermentation of certain musts, rich in nitrogenous matters, is not well conducted, especially as regards temperature, a certain quantity of lactic acid is very easily formed, which is a bad defect. This happens generally in certain years in warm countries, where the so-called sweet-sour wines are produced.

It is difficult, not to say impossible, to take away the defect of milk-sourness; the different methods proposed, including that of refermentation, do not succeed; consequently, the best thing is to prevent it by a thorough defecation of the must, and a properly regulated fermentation, not allowing the temperature to rise to a point at which the alcoholic ferment becomes inactive, and thus preventing it from reducing all, or the major part, of the glucose contained in the must.

SUPPLEMENTAL REPORT

OF

C. J. WETMORE, CHIEF EXECUTIVE OFFICER,

INCLUDING HIS TRANSLATION OF

NEW RESEARCHES UPON THE RESISTANCE OF, AND THE EXEMPTION FROM, PHYLLOXERA.

By A. MILLARDET.

SUPPLEMENTAL REPORT OF C. J. WETMORE,

Chief Executive Officer.

San Francisco, September 15, 1892.

To the Board of State Viticultural Commissioners:

Gentlemen: I herewith submit the following supplemental report as Chief Executive Viticultural and Health Officer.

Respectfully,

C. J. WETMORE,
Chief Executive Officer.

OUR MARKET IN ENGLAND.

During the past few years our still and sparkling wines have obtained a good foothold in the English market, and the prospects are that we will soon be able to dispose of a large quantity of our best wines in that country.

Up to the present year, Mr. Edward J. Howell, the London correspondent of this Commission, has always informed me that our wines could never be sold in England. When he called on me this year, he told me he had changed his mind about our wines, for during the past year he had found them served in many hotels and clubs in London, and that they were giving good satisfaction. I then requested him to write me an article for publication on the subject, which he kindly did. The following is his communication to me:

16 Mark Lane, London, August 9, 1892.

Clarence J. Wetmore, *Chief Executive Officer Board of State Viticultural Commissioners, San Francisco:*

Dear Sir: In response to your inquiry for information respecting prospects for realizing on Californian wines in the London market, permit me to say that what I have now to report is of a more favorable nature than my former answer to your inquiries.

The changed conditions for such realization are owing to certain facts, which I will explain.

When I advised you not to look to the European market as an outlet for Californian wines, the conditions were such that you would have had an unprofitable struggle against a long-standing prejudice for a pure Médoc wine of a distinctive character. Now the position is entirely changed. Since the devastation of the French vineyards by phylloxera the natural red wines from southern Europe generally found their way into our market. These at first were disguised as Bordeaux wines, but now we have them under their more correct designations. And thus the public taste in Great Britain has generally become more liberal, and French and German light wines are no longer almost alone in our market. It seems but a short time ago that it took Herculean efforts to create a demand and obtain a trade for the wines of other countries.

The testimony of a legion of M.D.'s was required to produce only a comparatively limited business in Hungarian, Greek, and Australian wines. Now the recommendations of these M.D.'s have ceased to be a necessity, and wines from the Cape, from Spain, Algeria, and, indeed, all southern European countries, are being imported, and find a regular market in London. These, in consequence of the admirable facilities for blending them, and before the duty is paid, are now blended together by the large wholesale merchants and made into "claret," much to the profit and satisfaction of the importing merchants and public generally. This work was formerly done in Bordeaux, but is now accomplished in all the principal centers of trade in the United Kingdom, and the British public have now the advantage of drinking a very fair wine. By the system of government analyzing we are kept pretty free from improper adulterations, and the result to the public is that they obtain a good, pure, and cheap wine. In addition to this there is a gradually increasing trade for Californian wines under their proper names, and there is hardly a town in England where such wines are not offered by enterprising merchants to consumers, who buy them out of curiosity and interest in all things American.

I think you will agree with me, therefore, that the present time is a favorable one for the introduction of Californian wines into the London market. I am enabled to say this with more confidence, as I know from my own experience that a large quantity of Californian wine is at this time being largely used by firms with whom I am in close business relations.

It is well, however, that certain facts must always be remembered. The English wine merchant is a man educated to his business, and knows wine almost as a science. He would require thoroughly sound wine, vinous in character, and without any unpleasant peculiarity, especially that raspberry flavor of which I have so often complained.

The long voyage would be an advantage for a properly fermented and sound wine, which would have the effect of aging it considerably.

The advertisement given by the recent importations of Californian fruit into England would greatly assist in helping the experiment of consigning wines to that market. It would be necessary that such consignments should be sent in sufficient quantities to command attention, and that the various interests should be united under one consignee. By this means much loss and disappointment would be avoided. Unless a proper system of realization were adopted, in which the various interests would be prevented from conflicting, the experiment would be attended with considerable risk. Assuming, then, that all the various interests in California were united under one agency in England, it would be greatly advantageous to establish uniformity in other matters, to wit:

It would be useless to send sweet wines, or any so-called "Ports" or "Sherry." Hamburg is quite able to manufacture any quantity of such wines out of pure Elbe water, which would compete with Californian wine.

Each estate should have its distinctive trademark, without attempting in any way to imitate French names. The various grades should be indicated, and each class should assume its relative position under such distinctive trademarks. Thus, each separate brand would have its proper value, and would not in any way interfere with other brands, in

the same manner that corresponding French products do not interfere with each other in realization.

Unsound wines, or wines below a certain standard of quality, should not be shipped to London, as any inferiority or faultiness in quality would at once be detected, and reflect upon the value of the wines of the State. Thus, by this combination, the prestige of Californian wines will be maintained, and the interests of the viticulturists would be protected, and a general standard of value in their wines would be arrived at.

The union of interests would thus establish the Californian wine trade upon its proper basis. Unless this is done there is great danger that the promiscuous importation of wines of low value to a market where their reputation has yet to be made, would lead to an unnecessarily low value being placed upon them. It should be remembered that the average quality of good Californian wine is quite equal to the ordinary growths of France and Germany; therefore there is abundant encouragement to establish such a system as I have recommended for the judicious management and control of exportations to this market. If your Board will take the matter in hand at your end, I shall be glad to give the matter my best attention in London. I am quite ready to devote myself to establishing the reputation and business of Californian wines, provided I am given the necessary support. Provided the business could be established upon this basis, I think there would be no difficulty whatever in eventually obtaining the aid of sufficient capital to organize a trust to place the matter beyond the region of a possibility. I have hitherto been slow to advise the exportation to Europe of Californian wines, but for the reasons I have given you, I am now satisfied that they may be made to take their proper place in the wine markets of the world.

I shall be glad to hear from you, and have much pleasure in placing my services at your disposal.

Faithfully yours,

EDWARD J. HOWELL,

European Correspondent of the State Viticultural Society, etc.

EXPERIMENTAL STATIONS.

In the former reports of this Commission a great amount of space has been devoted to the phylloxera, its method of propagation, its effects on the roots of vines, etc., and also to the resistant properties of the different American vines, and there is no further need of general information on these subjects. What is needed now by the vine growers is accurate information regarding the resistant properties of the different varieties of American vines in the different counties of the State. In certain soils one variety will resist better than another, and to determine which is the best variety for any county experimental plots will be established by this Commission in all sections where the phylloxera now exists. In these experimental plots all of the different varieties of resistant vines will be planted and grafted, and yearly reports will be made showing the success or failure of all the varieties. The vineyardists will then have an opportunity to examine the vines, and so determine for themselves the best variety or varieties to plant in their county. Such experiments have been conducted in France for many years, and have proved of great advantage to the vine growers of that country. The latest report of Prof. A. Millardet on the resistant properties of the

different American vines is a very interesting one, and I have taken the liberty to translate it, and include it in my report. I am in hopes that after our experimental plots have been in existence for several years, this Commission will be able to make a report to the vine growers of this State of as great importance to them as this one of Professor Millardet's has been to the vine growers of France.

These experimental plots will be located in Napa, Sonoma, San Joaquin, and Santa Clara Counties. The location of the same will be decided upon during the coming winter, and they will be planted next spring.

This move on the part of the Commission will be appreciated by the vine growers, for no work of this kind has as yet been attempted in the State, and the information they have received concerning the resistant vines and the proper ones to plant, has been very meager.

At a meeting of the Executive Committee of this Commission, held September 12, 1892, I presented the following plan for establishing these experimental plots, and it was unanimously adopted:

San Francisco, September 12, 1892.

To the Executive Committee of the State Viticultural Commission:

Gentlemen: At the last meeting of your committee you requested me to draw up a plan for carrying out your idea of establishing experimental plots in different sections of the State, for the purpose of testing the resistant properties of the different American varieties, and also for determining the best varieties of European vines to graft upon them.

It is a well-known fact that a certain American variety will resist completely the attacks of the phylloxera in one place, while planted in another locality, where the climate and soil are different, it will be only partially resistant. In order, therefore, that the vine growers of the State may be able to determine which is the best variety of the resistant vines to plant in his locality, I would advise the adoption of the following plan for establishing experimental plots in those counties where the phylloxera is known to exist:

First—That there should be a plot established in the following counties: Napa, Sonoma, Santa Clara, and San Joaquin.

Second—That each plot should contain two acres.

Third—That in each plot there should be planted all the principal varieties of resistant vines.

Fourth—That each plot should be located in a vineyard where phylloxera is known to exist.

Fifth—That the selection of the plots shall be left to the Commissioners who represent the districts in which they are situated.

Sixth—That the cost of planting and taking care of the plots shall be borne by the Commission.

Seventh—That these plots shall be under the supervision of the Chief Executive Officer, who shall have power to purchase the necessary vines, and give instructions how they shall be planted and taken care of. He shall receive his instructions from time to time from the Executive Committee, and he shall be required to make a report to them for publication, at least twice a year. This report should show the number of varieties planted, and the relative condition of each variety in each plot. The Chief Executive Officer should be required to visit each plot at least once a month, from April to September, and as often as necessary during the remaining months.

Eighth—That these plots shall be open to the inspection of all persons at all times.

Yours respectfully,

CLARENCE J. WETMORE,
Chief Executive Officer.

As I have said before, these experiments are being extensively carried on in France, and up to the present time we have been compelled to look to the reports from that country for any advice we may have needed in the selection of resistant vines. In the future this Commission hopes to furnish all the information that is needed on this subject.

The following report of Professor Millardet will prove of interest at the present time, and will show how the experiments are carried on in France:

NEW RESEARCHES UPON THE RESISTANCE OF, AND EXEMPTION FROM, PHYLLOXERA.

By A. MILLARDET, Professor of the Faculty of Science of Bordeaux.

SCALE OF RESISTANCE.

Viticulturists often find it necessary to compare and to estimate the resistance to phylloxera of the different American varieties used either as grafting stocks or as direct producers. To do this they are in the habit of reporting that a variety resists in such and such soils for a greater or less length of time, or that it commences to deteriorate after so many years of culture, or that it grows more or less vigorously than some other variety. The condition of the roots is scarcely ever questioned, and yet there is to be found the principal proof of resistance. The vigor of the vine can be sustained by the nature and fertility of the soil, by the climate, etc., and can disappear at any moment, even after many years of duration, under the action of the phylloxera.

A considerable time ago, in 1877, after having considered the phenomena of resistance a little more closely than had been done up to that time, and even more so than is usually done at the present time, I recognized two very distinct kinds of causes of resistance: First, those inherent in the plant, which were designated under the name of intrinsic causes; second, those independent of the plant, or, in other words, exterior to it, which were called extrinsic causes of resistance.

The intrinsic causes are allied to the very nature of the plant, which is the cause of its being more or less attacked by the phylloxera; of the punctures of that insect, producing swellings, nodosities, and tuberosities, more or less numerous, upon roots of different degrees of strength; the cause also of these swellings rotting more or less easily, more or less deeply, and by that rot determining more or less rapidly the enfeeblement of the roots upon which they are situated, and consequently at last the death of the vine.

The extrinsic causes are all those which, increasing or diminishing the vigor of the plant, favor or retard the reparation of the organs attacked by the insect. Two new extrinsic causes of resistance have been revealed to us since my article in "La Question," published in 1877: (1) In grafting, by Dr. Davin; (2) In certain methods of pruning, the result of which is seen upon the development of the roots of the plant, by M. Dezeimens.

I ought to add that, according to another theory, the soil and the climate can act upon the resistance in favoring or hindering the approach, the dissemination, and the activity of the phylloxera. Sand of a certain fineness is an obstacle to the spread of the phylloxera from the surface to the roots, and from one vine to another. The same varieties of vines, in soils as similar as possible, resist for a much longer time in the west and central portions of France than they do in the south, because in warmer climates the phylloxera lives dormant a much less time, and

because its multiplication, as well as the rotting of the roots, are there favored by a higher temperature. As the effective resistance of any variety whatever depends upon the concourse of all these causes, intrinsic as well as extrinsic, one comprehends, *a priori*, how variable it must be, and experience demonstrates the same fact. For instance, a certain variety of vine which apparently ought to possess, upon a given point, an almost unlimited resistance, one finds perishing in a few years, under the same climate in a different soil, or under another climate in a soil as similar as possible. Since the publication of my article in "La Question," most of the extrinsic causes of resistance have been reunited under the name of adaptation to the soil and to the climate. The promoters of adaptation have gone so far as to say that, provided that an American vine be well adapted to its condition of existence, its effective resistance ought to be sufficient, whatever may be its intrinsic resistance. It is not necessary to say that this opinion rests upon a complete confusion of all the phenomena, and that it finds itself contradicted by a multitude of facts.

The reader sees clearly how numerous and various are the extrinsic causes of resistance, and how difficult in consequence it must be to appreciate with some exactitude their action upon the plant and the reaction of the latter. It is not the same with the intrinsic causes, as we shall see.

From the beginning of my studies upon these phenomena, I have remarked that the resistance to the phylloxera is an hereditary property. It belongs to some species of wild vines of America and not to others; also, that the varieties cultivated by the Americans are resistant or not, according as they descend directly from resistant or non-resistant species. Furthermore, as these cultivated varieties are most often the result of crossings between resistant and non-resistant species, their resistance is generally intermediate between those of the species which compose them. Thus, the *Clinton* is less resistant than the *V. Riparia*, because it is the product of the cross of that resistant vine with the *V. Labrusca*, non-resistant. I refer for all facts of this kind to my "Historie des Vignes Americaines."

Accordingly a person could determine the resistance of a hybrid vine, if it were possible to recognize its parents and in what proportion they are mingled in it. In fact, the problem can be solved by that method in some very simple cases, but the complexity of the laws of hybridation is such that generally it is insoluble.

Since that method, which one would call *phylogénétique*, from a term borrowed from natural history, only furnishes us, the greater part of the time, with uncertain results, it remains for us, in order to appreciate the intrinsic resistance of a given vine, to study and compare the number and gravity of the injuries that the phylloxera does to its roots. The following will show in what conditions it is important to place ourselves for this study, so as to be as certain as possible that the number and gravity of the injuries observed attain in a given case the maximum which they can attain in general. I have shown, some time ago, what these injuries are in "Rot and Phylloxera"(1882), "History of American Vines," introduction of the "Journal of Practical Agriculture" (June 24, 1880).

In some very rare cases, where the phylloxera does not even remain upon the roots and produces no injuries at all, the plant is said to be indem-

nified. With the greater portion of plants it stops at the end of the youngest roots, and punctures them at about .039 of an inch from the extremity, and fixes itself at that point. In less than eight days a nodosity, having generally the form of a bird's head, is found at the point of the puncture. These nodosities rot more or less rapidly; generally in the European vines, by the last of August they have almost all succumbed to the rot. In American vines it is about the same thing, with the exception that the nodosities remain healthy for a long time.

The nodosities, in rotting, cause the loss of the rootlets at the extremities of which they are located. Sometimes the rootlets grow in length after the nodosities have been formed on them, but the rot of the nodosities comes sooner or later, and renders useless this new growth. In such cases the rootlets, instead of perishing at their extremities, as in the first case, perish at a point higher up, or where the nodosity was first formed. The result is, however, the same.

The size of the nodosities vary very much. With the European vine they attain from .118 to .157 of an inch in thickness and .589 of an inch in length, while with the American vines of high resistance they rarely go beyond .039 of an inch in thickness and .157 to .196 of an inch in length. Between these extreme dimensions may be found all the possible intermediate ones. Their number varies very much; according to the varieties it is possible to find them on all, or nearly all, the rootlets (European vines); on others 60 per cent of the rootlets will have them, and from that down to 1 per cent. A great many American vines are not injured in any other way by the phylloxera, except the forming of a few nodosities, no matter what the age of the vines are or in what climate they are grown. Such vines have a very high resistance.

With the European vines, as well as with many American vines, a short time after the formation of a considerable number of nodosities upon the rootlets, the insects, having multiplied, return to the main roots, at first upon the smallest ones, then gradually upon those of a greater and greater size. In the European vine, a short time after the invasion, the insect is found upon roots of all sizes and of every age, and even upon the stock. Upon the new roots the insects are generally isolated, and they form at the place where each one of them is fixed a protuberance almost hemispherical, with a slight depression in the center, where the insect holds itself. That is what I call *tuberosity*.

Upon roots of several years' growth and upon the stock, the phylloxera are disposed in numerous families at the base of the lengthwise cracks of the bark, and the tuberosities become confluent, longitudinal bands of swellings, sometimes several centimetres in length. Tuberosities are never found upon the roots of vines that are free from nodosities. Usually the tuberosities are found on vines that have from 40 to 50 per cent of their rootlets occupied by nodosities.

Tuberosities are not found upon the large roots when the rootlets do not contain any. Therefore, it is useless to look for tuberosities upon vines which lack nodosities, and also upon vines whose roots of .058 to .118 of an inch in diameter are found to be free from them.

The size of the larger tuberosities vary. In their minimum of development with certain American vines they run from .039 to .058 of an inch in diameter by .019 of an inch in thickness. On the European vines the isolated tuberosities reach .157 of an inch in diameter and as high

as .157 of an inch in thickness (*Folle Blanche*). In general, plants that have little nodosities have little tuberosities, and vice versa.

The fate of the tuberosities is the same as that of the nodosities, viz.: the rot; but generally they succumb to it after the first year of their formation. The rot of the tuberosities proceeds from the surface, and extends progressively in depth. Little by little it passes beyond the bark of the root and arrives as far as the wood. The wood then turns black and is destroyed, and all that part of the root beyond the place where the rot started is lost to the vine. It is for this reason that the tuberosities are infinitely more dangerous than the nodosities. The rot of a nodosity, and accordingly the loss of a rootlet, is an affair of several days or several weeks only; months, and sometimes years, are necessary for the propagation of the rot of a tuberosity through all of the root, the length of time depending on the size of the root.

It happens frequently, especially so with the *Æstivalis*, that the rot, which has its point of departure in the tuberosities, is arrested in its progress in depth by layers of cork, which protect the underlying tissues from its actions. But when the tuberosities are large and numerous the rot always finds some means to turn from these natural barriers at several places (*Jacquez, Blue Favorite*).

As a general rule the larger the tuberosities the more easily they rot, and the more dangerous they are to the root upon which they are situated, and threaten the complete loss of the root in the near future.*

The regular succession of the phenomena which I have just explained, the production of the nodosities and the tuberosities, their size and number, furnishes the means of estimating in an exact-enough manner the intrinsic resistance of a variety. This fact is the most important one to know positively, because the vigor of a plant of high intrinsic resistance can never be put in peril by the phylloxera, no matter what the surroundings may be.

From 1885 to 1887 I had established upon these facts a classification of American vines with a view to their intrinsic resistance. Since that time the classification has been perfected by degrees, and changed to a sort of scale of resistance. We (M. de Grassel and myself) used it at first to determine the resistance of our hybrids. Some persons have had knowledge of it and have published it in a manner more or less complete; others have imitated it. Some day I may be able to continue my work upon this scale of resistance and give more details. At the present time I will limit myself to only a perception of it.

In the table which follows, the numbers are the coefficients of resistance. The explanation which follows them indicates the number and the gravity of the injuries which correspond to these coefficients. Afterwards come some examples taken from the best known varieties. The scale is divided into several sections, which correspond to the letters *a*, *b*, *c*, *d*, and each section is characterized by some new injuries of the phylloxera, or only by an increasing gravity, which is superincumbent on those of the preceding sections, so that the resistance decreases regularly from the top of the scale to its base, that is to say, from 10 to 0.

I have only sought to characterize freely the highest degrees of the

*Perhaps some one will say that in this theory of resistance I have made no allusion to that which has been proposed by M. Foex. I have not done so, for I believe that I refuted his theory some time ago in my "History of American Vines."

scale, the most important to the end in view, limiting myself to simple examples for the lower degrees.

a.—No injury.

10. Complete exemption. Example: *Scuppernong*, *Aramon Rupestris Ganzin* (according to M. Ganzin) *Rupestris*, *Æstivalis de Lezigan*, some rare *Riparias*, *Rupestris*, *Cinereas*, etc.

b.—Only nodosities, usually very small. No tuberosities.

9.5. From 1 to 10 nodosities for every 1,000 rootlets. Example: *Cordifolia-Rupestris-de-Grasset*, some *Riparias*, *Rupestris*, *Cordifolias*, *Cinereas*, etc.

9. As many as 5 nodosities to every 100 rootlets. Example: *Rupestris-Cinerea-de-Grasset*, a considerable number of *Riparias*, *Rupestris*, *Cordifolias*, *Cinereas*, etc.

8.5. As many as 10 nodosities to every 100 rootlets. Example: *Azémar*, the majority, perhaps, of the *Riparias*, *Rupestris*, etc.

8. As many as 20 nodosities to 100 rootlets. Example: *Gigantesque* (?), many *Riparias*, *Rupestris*, etc.

7.5. As many as 40 nodosities to every 100 rootlets. Example: *Rupestris*, *Taylor*, *Black Pearl*.

c.—Nodosities becoming insensibly larger and usually more numerous than those of *a* and *b* in proportion as one descends the scale; tuberosities rare and small (.058 in. in thickness at the most).

7. Nodosities equally or more numerous than the preceding ones. Tuberosities very rare and small (.058 in. in breadth by .019 in thickness), and only upon the roots of .078 in. and less in thickness. Example: *Berlandieri* (of Docteur Davin), a considerable number of *Riparias* and ordinary *Rupestris*, some *Champins*, and some *Riparia Candicans*.

6.5. Ditto for the nodosities, the latter being larger. Tuberosities rather frequent upon the little roots; rare upon those from .078 in. to .118 in. in diameter, attaining .039 in. in height. Example: *Solonis* and a few of its seedlings, many *Champins* and *Riparia Candicans*: some *Riparias*, *Rupestris*, etc.

6. Ditto for the nodosities. Tuberosities a little larger and more numerous, and upon stronger roots. Example: *York Madeira*, most of the *Champins*, and some seedlings of the *Solonis*.

5.5. Nodosities and tuberosities still larger and more frequent. Example: *Huntingdon*, *Noah* (?).

d.—Nodosities and tuberosities more and more numerous and larger; the tuberosities increasing insensibly according as one descends the scale, .118 in. in height (in the European vine), and occupying larger roots (the roots of every age, and even the stock in the European vine). Roots from .039 in. to .078 in. in diameter nearly all rot in September, in the South; larger roots, more and more contaminated, and rotted in the interior, according as one descends the scale.

5. Example: *Herbemont*, *Jacquez* (?), *Noah*.
4.5. Example: *Jacquez*, *Cunningham* (?).
4. Example: *Blue Favorite*, *Cunningham*, *Vialla* (?).
3.5. Example: *Taylor*, *Clinton*, *Vialla*.
3. Example: *Elvira*.
2.5. Example: *Othello*, *Rulander*, *Delaware*, *Waverley* (?).
1.5. Example: *Senasqua*.
1. Example: *Isabella*, *Triumph*.
0. Example: *European Varieties*.

One will notice that the name of several varieties is followed by an interrogation point. It is when my experience has seemed insufficient to fix in a more certain manner the place of these varieties in the classification.

In spite of its imperfections, I hope that this scale of resistance will render some service, and it is especially this that I desire. One may easily criticise it, but may those who feel disposed to do so reflect first how delicate this subject is, and how it necessitates observations. It has cost me thousands of observations with the naked eye upon the fresh subjects in the vineyard, with the microscope upon specimens preserved in alcohol and in the cabinet.

It will be necessary still to indicate the precautions with which it is indispensable to be surrounded, when one wishes to judge with some exactitude of the degree of intrinsic resistance of a given plant. An example will be better than all the reasonings to enable one to judge of the difficulty of this class of observations. In the month of March, 1884, I sent to M. de Grasset, at Laval, near Pézenas, thirteen hundred young hybrids, Franco-American, springing from a seedling of the preceding

year at Bordeaux. He had just dug up in deep, gravelly clay a vineyard dead from phylloxera. The hybrids were planted at the rate of two thousand to 2.47 acres. Two years after the plantation seemed completely invaded by the insect. At the third and fourth years several hundred plants had already succumbed, while nearly double that amount showed more or less enfeeblement; about two hundred stocks presented an unusual vigor. Attentive diggings were made, and coefficients of resistance given, according to the state of their roots. The coefficients of these stocks varied somewhere from 5 to 10.

The following year ten cuttings of each of the stocks which had a coefficient higher than 7 were set out 328 feet from there, in a vineyard newly dug up that the phylloxera had destroyed. These cuttings were planted four thousand to the acre, and in the month of June, 1889, some handfuls of phylloxerated roots were laid upon their young roots. In 1890, two vines of that year's growth, from these same plants, were sent to me, which were planted in my experimental vineyard at Talence, near Bordeaux, in gravelly-clay soil, from 7.80 ins. to 11.70 ins. in depth, overlying a white marly limestone, in holes from which I had just had dug up as many phylloxerated stocks. In 1891, an inspection of the roots of these plants was made, in the two plantations of Laval, the first time in June and the second time the first of October, and at Talence towards the middle of the same months; new coefficients were given at each inspection.

The reader may believe that at the present time the hybrids which are indemnified at Laval in the first plantation made in 1884, and where 97 to 98 per cent of the plants which surround them are dead, or at least attacked by the phylloxera, are equally indemnified in the plantation of ten stocks made about four years after, and in that of Talence made in 1890. It is nothing of the kind. Several mother stocks are at the present time absolutely indemnified (that is to say, merit the coefficient 10) in the plantation of 1884, which have only the coefficients 7, 6, and even 5, in the neighboring plantation of ten stocks, and at Talence. Several plants have 10 in the two plantations at Laval, which have only 7 to 5 in that at Talence.

To what are these considerable errors due, and what is it necessary to do to rectify, or rather to prevent them?

The first explanation which presents itself to the mind, is that there may be in different parts of the field, at the foot of certain stocks, several colonies of those numerous species of insect enemies of the phylloxera, which are opposed to its multiplication. The only means of preventing one's self from falling into such an error, will be to test, as we have done, the resistance of the plants; not of one vine, but of several; not at one point only, but at several different points.

Another explanation is furnished me by the following observation, which enlightens us, at the same time, upon the first cause of resistance; that is to say, upon the reason why certain vines are never attacked by the phylloxera, whilst others are a little, and others much. Many years ago I had the idea of subjecting, simultaneously, several vines of diverse nature to the action of the phylloxera. That was in summer. I took out of the pots with care several seedlings of the *Riparia*, *Cordifolia*, *Clinton*, *Jacquez*, *Solonis*, and *Chasselas*;* then I put their roots in a

* I cite from memory; there may be some nominal errors of variety, but the spirit is there, if not the letter, of the composition of the lot of plants experimented upon.

large jar, containing a little water, into which some of them plunged their extremities, while the stems were inserted in the cork, which was cut in half and pierced with holes. To restrain the exhalation, two or three leaves only were left on each plant.

Several days after, a great number of new rootlets being developed, either in the water or out of the water, in the upper part of the jar, I introduced below the cork two or three leaves of the *Clinton*, covered with phylloxerated galls. They were suspended by a thread, in contact with the roots, after which the cork was replaced, and all the holes carefully stopped up with wadding.

Twenty-four hours after I could see circulating, either upon the sides of the jar or upon the roots, hundreds of phylloxera newly hatched and coming out of the galls. I had then the opportunity of establishing the following fact: Upon the rootlets of the *Cordifolia* and of the *Riparia* these insects moved rapidly, rising and descending without stopping; or, if they stopped, it was only for a moment. On the contrary, upon the rootlets of other plants, after having wandered for some time, they fixed themselves at the extremity, and moved no more. Two or three days after the greater part of the insects were fixed, and I could distinguish numerous nodosities forming upon the *Chasselas*, a less quantity upon the *Clinton*, *Jacquez*, and *Solonis*, and none upon the *Riparia* and *Cordifolia*.

I concluded that during the first hours the movements of the young phylloxera were so rapid and animated, because they were in search of nourishment. They only passed up and down the roots of the *Cordifolia* and the *Riparia*, but did not stop, because the latter did not suit them, for some reason or other. They stopped and fixed themselves upon the others, because they pleased them more. Those of the *Chasselas* were the ones that pleased them most of all.

My first thought was that if they did not fix themselves upon the *Cordifolia* and the *Riparia*, it was because the epidermis of these rootlets being stronger and thicker, offered to their suckers, yet very feeble, a resistance which repulsed them and decided them to go elsewhere. But an attentive examination of these rootlets with the microscope, and of those of the *Chasselas*, revealing to me no appreciable difference in the thickness of the exterior epidermic membrane, I was obliged to look for another explanation.

I was satisfied with the following, which I believed to be the right one: The insect, in passing up and down upon the surface of the roots, stopped from time to time to eat. If the flavor of the root suited him, he fixed himself; if otherwise, he sought for food elsewhere. The flavor of the *Cordifolia* and of the *Riparia* being to him very disagreeable, he went on farther. As that of the *Clinton*, *Jacquez*, etc., suited him better, he willingly stopped upon these varieties; but all the insects of a more refined taste, or less hurried by want of food, which had refused the preceding roots and stopped upon those of the *Chasselas*, left them no more.

This conclusion is in harmony with the recent researches of M. Büsgen upon the biology of the insects.

So then, as I believe I have announced somewhere, the plants indemnified are so because the phylloxera cannot accommodate itself to the flavor of their roots; those which are simply resistant, are so because the insect is only nourished by them with a certain repugnance; those which are

not so, and where the insect multiplies, is because the juice that it draws from the plant pleases it, and because an agreeable nourishment favors its multiplication.

It seems probable to me that in the experimental fields, as those of M. Grasset, the oldest, especially (of 1884) where the most varied hybrids were found, the phylloxera comports itself in a like manner as in the jar, which has been spoken of above. The roots of all the plants finding themselves mingled together, the insect which moves on their surface makes a choice of those which suit its taste, and refuses the others. In a nursery of this kind the plants indemnified are only so by comparison, if I may express myself so, that is to say, in consequence of their neighborhood to plants of which the roots have a less disagreeable flavor.

It follows, therefore, that plants indemnified in a plantation of this kind will no longer be so if one puts them all together, or if they are only surrounded by varieties of a very high resistance, of which the flavor is still more disagreeable to the insect than to theirs. The latter, rather than be left to perish from hunger, will attack their roots in spite of the repugnance to their taste. But that disagreeable nourishment, taken against their will and in a small quantity, will never favor much its multiplication, and that will be a condition of resistance for those plants. Experience has taught me, in fact, that in those conditions the plants seeming indemnified until then, may be seriously enough attacked by the insect. One sees, then, in two or three years at the most, often from the first, the coefficient 10 is replaced by others of a less degree. I have never seen it fall below from 5.5 to 5, that which is still a fine enough and sufficient resistance in some cases.

I cite some examples in support of these conclusions:

About eight years ago M. Ganzin showed me, at his place at Pradet (Var), some vines of the *Rupestris* which bear his name, which have been grafted deeply upon vigorous stocks of the *Clinton*. The roots of the *Clinton* were covered by hundreds of nodosities; there was not one of them upon those of the *Rupestris* which were intermingled with those of the *Clinton* spoken of above. We thought, M. Ganzin and I, that that *Rupestris* was indemnified.

I was living under that impression, when four or five years later, after having shown to a visitor in my vineyard, at Talence, many phylloxerated roots, and wishing to show him some indemnified ones, I called his attention to that same *Rupestris Ganzin*. At the first cut of the spade, and to my great confusion, some nodosities appeared. It is true that the plant of which I had dug the roots was surrounded by about fifty vines of the same variety. Some of these vines, visited in their turn, also showed some nodosities, others presented none.

In 1887 M. Couderc showed me the roots of the stocks of the *Gamay Couderc* in the middle of his field of seedlings. I still see the superb beard of the root, composed of several hundred fresh rootlets, absolutely healthy and without the least injury from the phylloxera, intermingled with some roots coming from neighboring hybrids, which were found covered with nodosities. I was enthusiastic, and several weeks after I proclaimed loudly the immunity of the *Gamay Couderc*. I ignore what is the coefficient which this plant really merits, but what I do know is that he who raised it himself has no longer faith in its immunity.

All this shows what is necessary to do to judge of the immunity of a

plant from phylloxera. It is indispensable to make observation, not upon a single plant, but upon several, situated in two or three different localities, in soils favorable to the phylloxera, and even superficial, if possible. It will not be necessary to have in the neighborhood of the plants under observation a vineyard, or any variety of the highest resistance (*Riparia* and *Rupestris*, for example). To avoid a delay in the natural infection, it is produced artificially in the course of the summer; once at first, afterwards as many as three times successively, if the preceding experiments have not been successful. One sees that the immunity is of an extremely delicate authentication, and is it the same with the fixation of other coefficients? No, happily not. If we suppose a vineyard to be only surrounded by varieties of a very high resistance, and that the phylloxera took the first time on the roots, one could feel certain, I believe, that two or three years at the most, after the infection, the state of the roots will be such that it will change no more, and that the coefficient given will be definite. But here still it will be necessary to make experiments upon two or three different points in superficial soil, in a manner to put it in condition favorable to the insect, and to prevent errors which might come from the presence of the enemies of the phylloxera, or even from other unfortunate circumstances which it is impossible to foresee.

One has seen that several degrees of the scale are characterized by a certain proportion of nodosities to every thousand or every hundred rootlets. In those cases, the coefficient will have as much more certainty as the number of examined rootlets will be greater in number.

These observations ought to be made in September. At that season, with the American vines, a great number of nodosities are still fresh, and those which have already rotted do not remain so easily in the soil when the roots are dug up later. Moreover, at that season, the phylloxera has already performed all its work—that which has not been done earlier in the year. The examination of the tuberosities can be made any time of the year.

There is in the scale of resistance a point perfectly fixed, easy to determine, and of capital importance, when the studied vines are destined to serve as grafting stocks: it is the appearance of the tuberosities (coefficient 7).

In fact, in 1888 I established by some examples (and I do not believe that there exists at the present time a serious observer who contests it) that in the olive region, all the varieties which have tuberosities, if they are ever so small (*Solonis*, *York*, *Huntingdon*, *Noah*, *Herbemont*, *Jacquez*, *Cunningham*, *Taylor*, *Clinton*, *Vialla*), are grafting stocks insufficient in resistance, even in good soils, and by greater reason in the poor soils. From that the precept is to use as grafting stocks in those countries only vines exempt from tuberosities, that is to say, having a coefficient higher than 7. In the regions farther north, especially since I have seen in the west and the southwest, in deep soils, grafts of ten, twelve, and fifteen years upon *Solonis*, *Clinton*, *Taylor*, *Viallá*, *Jacquez*, pefectly vigorious and fruitful, with the roots in a good state, I think that one can utilize as grafting stock, at least in deep soils, varieties situated lower in the scale than those which are necessary in the south. Nevertheless, prudence commands one to pay attention, when one can do it, to the plants of a resistance as high as possible. The havoc made upon the roots by the phylloxera (the tuberosities especially) are always a

cause of enfeeblement to the plant, and must be paid for, sooner or later, by a diminution in vigor and production, or by expensive fertilizing.

As for direct producers, it seems from general experience that one can in the south, in good soil, take those having coefficients as low as 5, and even 4.5, and in regions more northerly, as low as 3, or even 2.5, according to circumstances.

NOTES UPON SEVERAL GRAFTING STOCKS RESISTANT TO CHLOROSIS AND PHYLLOXERA.*

The hybrids between American species of vines have been a precious conquest to viticulture. They constitute, in fact, new grafting stocks, more or less intermediate between the component species, and reuniting in consequence, up to a certain point, the particular properties of those species—vigor, resistance to phylloxera, growing by cuttings, aptitude to live in certain soils, to receive the graft, etc. In several cases even an unexpected result is produced, as has been remarked by M. Ravey, by the apparition with these hybrids of properties which were lacking in their parents. It is thus that the hybrids between *Riparia* and *Rupestris* have a high resistance to the calcareous chlorosis, although each one of these two species, taken separately, is very sensitive to that affection. The hybrids between *Rupestris* and *Arizonica* seem to be in the same case

Results none the less important may be expected from crossing our European varieties with the American species, the latter giving to the hybrid resistance to the phylloxera and to mildew, and the European vine transmitting to it its adaptation to calcareous soils and to the different climates of our country, and giving to it, besides, an affinity for the European graft, which cannot exist to the same degree with the purely American grafting stocks. Not only has experience realized these theoretical promises, but besides it has produced in these hybridations, as in those which have just been spoken of, a happy fact that was difficult to foresee. In some cases, in fact, the resistance of the American vine passes wholly in the hybrid, without being enfeebled by the non-resistance of the European parent.† The first examples of that phenomena are due to MM. Ganzin and Couderc; we have had the occasion of establishing a large enough number of others, M. de Grasset and I, during the course of these latter years.

Thus it is not astonishing that certain of these hybrids are presented here as being as resistant as the best *Riparias* and *Rupestris*, or even as being completely indemnified from phylloxera; because not only these facts are affirmed by the most worthy observers, but they may be established anew each day, by persons who would wish to examine them, in the plantation of M. de Grasset.

It will be well, without doubt, to tell by what experiments we have been able to assure ourselves, my co-worker and I, that the hybrids in question in these notes are either completely resistant to the phylloxera, or even absolutely indemnified from that insect.

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*These grafting stocks are offered for sale by M. Ferdinand Couisset, proprietor at Montagnac (Hérault), member of the Society of the Agriculturists of France.

† It may be seen in my essay on the hybridation of the vine (1891. Bordeaux, Féret; Paris, Masson) in what conditions these curious phenomena are produced.

Plants, in 1884, one year old, in soil a pebbly-clay, up to that time occupied by an old vineyard which had just died from phylloxera, were found completely invaded by the insect from the second to the third year. During the fourth year some attentive diggings were made at the roots of the finest stocks, and a first coefficient of resistance was given. At the same time some cuttings of these same plants were placed in another vineyard, also dead from phylloxera, and from the month of June of the following year some handfuls of phylloxerated roots were placed upon their roots. In the month of June of that year (1891) diggings were made by M. de Grasset and I, and the roots observed with the greatest care, both upon the mother plants and upon those infected and coming from cuttings, and new coefficients of resistance were given. Finally, the last of September a new and more minute examination was made, both in these same two plantations of Laval and in my phylloxerated vineyard at Talence, near Bordeaux, where, besides these hybrids, were found only plants of the highest resistance. The definite coefficients of resistance attributed to each of the plants in question were results from taking these observations as a whole. As a passing remark, none of these coefficients are inferior to 7.5.

It will be good to recall, in order to realize the importance of this minimum coefficient of 7.5, that in 1888 I proved by some examples (and these last years have given me a right to think) that in the olive region the *Solonis*, *York Madeira*, *Jacquez*, *Vialla*, etc., which, ungrafted, resist the phylloxera, succumb to its punctures if they are grafted, even in soils of good quality. This result is prompter still in poorer soils. Judging from that, I advise the planting in that region of grafting stocks of a higher resistance. Now, as all varieties which have been questioned have this in common, that they bear tuberosities more or less numerous and developed upon their roots, I concluded that it was absolutely necessary to employ in the Mediterranean region only grafting stocks exempt from tuberosities, however small they may be. In climates more temperate a resistance as high, if it is still desirable, does not appear to be as indispensable. It is in order to carry out this principle that we have followed with so much care, M. de Grasset and I, the development of our hybrids for nearly eight years, putting aside without mercy plants, even the most vigorous, as soon as the smallest tuberosity had been once established upon their roots. Thus, then, I repeat, not one of my twenty plants has a coefficient of resistance inferior to 7.5; some have 10; the greater part have some intermediate coefficients between these two extremes. Will they, with this high resistance, and even this immunity, hold in all soils where they may be placed? The varied tests to which we have subjected them during these last eight years seem to promise it, and we dare to hope it. To affirm it would be, one comprehends, to go beyond the limits of scientific induction.

The degree of resistance to the phylloxera of these hybrids being thus clearly characterized, let us see what is their resistance to calcareous chlorosis.

Although this last affection proceeds essentially from the presence of certain quantities of carbonate of lime in the soil and in the subsoil, it is impossible at the present time to say what number of grains of limestone must be contained in 100 grains of a certain soil for the commencement of the chlorosis for a given grafting stock. It happens, for example, that a variety is affected by chlorosis in a soil containing

only 15 per cent of limestone, while it remains green in a soil which contains double that amount. It is that the ill-omened action of the carbonate of lime is augmented or diminished in a most irregular manner by a crowd of circumstances generally difficult of estimation, such as the depth of the soil, the nature of the subsoil, the humidity, the state of culture, perhaps also the fertility, etc. To this difficulty is joined another; it is that a variety very often remains entirely green in a calcareous soil as long as it is not grafted upon, only to bear nothing but chlorotic grafts as soon as it is given a European head; and it is not even proved that in these cases the chlorosis does not depend sometimes upon the species of the graft.

It is impossible for us to establish a scale graduated centesimally for the resistance to chlorosis in limestone in a given soil; the better way, in order to appreciate that of the Franco-American hybrids, seems to be to compare them, in this light, to the grafting stocks best known up to the present time for that same property.

It is known that the most resistant to chlorosis, of the American grafting stocks, is the *Jacquez*. Now, all the Franco-American hybrids selected by M. de Grasset and I, do infinitely better than this variety in all the bad soils where they have been tried, grafted or not grafted upon. From the respective hold each of these hybrids has in the worst soils, their degree of individual resistance to chlorosis may be inferred. Thus, all have been planted within three years, and grafted upon within two years, in the pure, chalky soils of Charentes, a soil which one knows is the most refractory to the American vine, where the *Solonis* and the *Jacquez* themselves are subject to chlorosis, and are generally stunted when not grafted upon. Now, some of these hybrids bear at the present time grafts green, vigorous, and even fruitful in some chalky soils (not the worst, of course; for example, at M. Verneuil's vineyard at Cozes, and in one of the experimental fields of the Comté de Cognac), and this single fact, although this fine hold is not without exception, and it may not continue, shows how their resistance to chlorosis is superior to that of all the grafting stocks known up to this time.

I have still other reasons which allow me to recommend these hybrids for the restitution of vineyards in calcareous soils. Within four years they have been tried in the worst soils of the French vineyards, independently of the chalk, in lower Charente, at M. Bethmont's; at MM. Thibaut and Lacoste; at M. d'Hébray's, in le Tarn-et-Garonne; in the Lauraquais; at MM. de Malafosse and Calés; at Carcassonne; at M. Bary's; at Lezignan, at MM. Marron-Martin, Joulia, and Théron; in the Var, at MM. Davin, Ricavy, Barbier; in Saône-et-Loire, at MM. de Benoist and de Malartic; in l'Hérault, at MM. de Serres, Rey de Lacroix, de Grasset, Bouisset, etc., everywhere they have been placed in the worst soils that could be found, and cultivated without fertilizing. Many have succumbed to these rude tests, but a certain number, among which are those now placed at the disposal of the public by M. Bouisset, were found several weeks ago, and two years after grafting, to be perfectly green and vigorous, and even fruitful.

It is impossible for me to discuss in detail the nature of the soils where these hybrids have been experimented upon. It will be sufficient for me to indicate the hold they have in limestone of the worst soils among those where these plants have given satisfactory results.

At M. Bethmont's (La Grève, lower Charente), very bad soil, uncolored

to 5.85 ins. in depth at the very most; very stony, 20 per cent of limestone; subsoil consisting of a calcareous pavement impenetrable to the roots, 70 per cent limestone. Chalky land of M. Verneuil (Cozes, lower Charente), soil from 7.80 ins. to 11.70 ins. in depth, 45 per cent limestone; subsoil formed of chalky stones penetrable to the roots, 70 per cent limestone. M. de Grasset (Château Saint-Pierre, near Mont Blanc, Hérault), soil a marly, pebbly clay, uncolored, from 9.75 ins. to 11.70 ins. in depth, 40 per cent limestone; subsoil white marl, 66 per cent. M. Rey de Lacroix (Montagnac, Hérault), whitish calcareous soil, very stony, from 5.85 ins. to 13.85 ins. in depth, 63 per cent limestone; subsoil white limestone, friable, impenetrable to the roots, 81 per cent. M. de Serres (Montagnac), soil whitish pebbly limestone, from 5.85 ins. to 11.70 ins. in depth, 63 per cent limestone; subsoil white marl, 77 per cent.*

The following conclusion will be granted me without doubt. It is that the grafting stocks, which during three years without fertilizing have procured for their grafts, in the soils of this kind, a vegetation and a normal fructification, merit to be seriously considered. I fear it is true, in spite of some partial successes, that they may be insufficient for the chalk; but I am convinced that aside from the chalky formation they may be sufficient for the reconstruction of all the soils most subject to chlorosis, even the most feeble and superficial of Charentes.

May it be permitted me, still, to indicate the method to follow in the experiments of reconstruction.

Experience has taught me that the hybrids of which I speak have, individually, preference for certain soils. Let us suppose that four different ones of these hybrids (four of each number) be planted in two soils equally bad in respect to chlorosis, but different in other ways; it will happen nearly always that they develop in more or less unequal manner in each of these soils, so that the most vigorous of the four in one of the soils may be the most feeble in the other.

It appears to me, then, indispensable, when the question comes up of reconstituting a soil subject to chlorosis, to make a preliminary trial with several kinds of these grafting stocks, and not to choose definitively this one, or those which will have to serve in the reconstitution, until after the first, or even the second year of grafting. It is not a matter only, in fact, of finding a grafting stock sufficient for a difficult soil, but of choosing that one which will give there the best results.

It remains for me to say a few words on the vigor of these plants, their growth by cuttings, and on their grafting. As for their vigor, I can say without fear of being contradicted by the numerous visitors who have seen these hybrids at M. de Grasset's, that it is truly phenomenal. I measured, a few days ago, some of the mother stocks, raised from seed in 1883, and planted by M. de Grasset in 1884, at his country seat at Laval, near Pézenas, in a deep, pebbly-clay soil, of medium quality. Here is, in inches, the measure of these stocks, at the level of the ground:

No. 33. Three mother stocks, taken at random. The respective circumferences are found to be 11, 12, and 13 inches; say, at an average, a little more than 12 inches.

No. 139. Three mother stocks, also taken at random. Have measured, respectively, 11, 12, and 15 inches; say, at an average of 13.26 inches in circumference.

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*In all cases the determination of the quantity of limestone has been made upon fine land, either upon the soil or subsoil. These determinations are due to the kindness of my colleague, M. Gayon, Professor of the Faculty of Sciences at Bordeaux.

No. 143. Two mother stocks. Measured 13.6 and 14.4 inches; that is to say, at an average of 14 inches.

No. 160. Three mother stocks. Measured, respectively, 13.2, 14.4, and 15.2 inches in circumference; that is to say, at an average of nearly 14.4 inches.

The growth by cuttings is not under 80 per cent, and easily attains 90 per cent.

The grafting of cutting upon cutting has not yet been tried, but it does not seem that it ought to present the least difficulty.

As to grafting upon the rooted vine in place, it gives, certainly, results superior to those the best grafting stocks give. In 1890 and 1891 M. de Grasset grafted as well in l'Aude as in l'Hérault, more than fifty thousand of these hybrids with a result of 95 per cent. At this time these grafts seem to be respectively one year older than they really are. The grafting of 1890 gave that year a good quarter of an ordinary harvest. A very great number of stocks bore one dozen bunches of grapes; twenty and twenty-four have been counted upon some of them, and even as many as thirty.

As the greater part of these plants have deep roots, one might believe that they are imperfectively adapted to soils which have not much depth. It is nothing of the kind, as I am sure. When the roots arrive at the impenetrable subsoil, they change their direction and become horizontal, as do the tap-roots of the pines upon the heath. Many of our experimental fields (that of M. Bethmont, notably) have only 5.8 inches of arable soil upon a subsoil absolutely impenetrable, and that does not prevent many of our hybrids from vegetating there with more vigor, even than did formally the *Folle Blanche*, or the traditional varieties of the country.

Experience has taught us that in general all the selected plants belonging to the same hybridation (of the same number) have a resistance equally sensitive to chlorosis. Thus, for example, the seven plants which compose the numbers 33 A, A^1, A^2, A^3, B, B^1, B^2, placed side by side in the same experimental fields, acted in a similar manner when the soil was homogeneous. The same for the other numbers. The only notable difference between plants of the same number, which came to light under these conditions, are differences of vigor; generally they are feeble.

All these hybrids are nearly insensible to mildew in the open vineyard, and have no need of treatment. Those of No. 143 alone, if placed in a nursery, will have need of one or two treatments, in the great years of mildew, like that we have just passed through.

I wished by these short notes to enlighten the public upon the principal properties of these new grafting stocks, and to prevent questions for information being asked to which it will be impossible for me to respond.

In closing, I will indicate, in a few words, the distinctive characteristics of each of these plants, so that every one may be sure of their identity:

No. 33. Cabernet. Rupestris Ganzin. Plants vigorous; upright in growth. Foliage a rather dark green. Leaves rather small, folded, creased, almost completely smooth on both sides and the edge. Wood slightly bent at the nodes; internodes short. Color chestnut, more or less light, often studded with little black specks, protuberant, consequently scabious.

Plants fertile, but straggling. Leaves, in color, usually unchanged in the autumn.

Bunches of grapes small, A^3. Bunches attaining almost 6 inches in length. Leaves sometimes very slightly spotted with red, B^2.

Plants sterile. Leaves more or less colored in the autumn season.
* Aspect, slightly trailing. Internodes attaining about 6 inches in length, B[1].
* Aspect, *subérigé*. Internodes not exceeding 4¼ inches in length.
** Upper leaves entire, or slightly lobed, A[1].
** Upper leaves 3-5 lobes.
Upper leaves rather 3 than 5 lobes, A[2].
Upper leaves deeply lobed 3-5, B.
Upper leaves 5 lobes, most often uncolored in the autumn, A.

No. 139. Alicante Bouschet. Rupestris. Plants very vigorous, upright appearance. Foliage a beautiful green, rather glaucous, greasy. Leaves round, a little folded or creased, edge patulous, reflected. Wood large, flat, with a longitudinal groove on one side, interlodes short, color hazel, more or less dark, the largest ornamented by longitudinal bands, darker in color, which begin at the insertion of the leaves.

Plants fertile, very straggling. Leaves not at all or only a little colored with red in the autumn, A[2].
Plants sterile.
* Leaves slightly or not at all colored in the autumn.
* Leaves always more or less colored in the autumn.
** Highly colored. Veins almost unbearded on the underside, edge unbearded, B.
** Color ordinary.
Upper leaves slightly lobed 3-5, edge of the lower leaves slightly pubescent, A.
Upper leaves entire, the lower with smooth edge, B[2].

No. 143. Aramon. Riparia. Plants very vigorous, aspect trailing. Foliage of very light color. Leaves large in general, heart-shaped. Wood straight, of light color, smooth. Internodes of medium length.

Leaves spotted with red in the autumn. Plants very straggling, A[2].
Leaves never spotted with red.
* Plants fertile, A.
* Plants sterile.
** Internodes attaining 5.8 and 6.2 inches in length. Full-grown leaves almost completely unbearded, edge unbearded, B[2].
** Internodes reaching only 4.6 inches in length. Plants almost absolutely unbearded. At the very most, a few awl-shaped hairs at the axil and under the large veins of the old leaves. Edge of the leaf unbearded, B[1].

Plant presenting woolly hairs, rather frequent at the extremity of the shoots, upon the young leaves and tendrils. Old leaves notably pubescent and even woolly, especially underneath them, upon the veins. Edge of the leaf very slightly woolly and pubescent, A[1].

No. 160. Gros Colman. Rupestris. Plants extremely vigorous, aspect upright and trailing. Foliage rather deep green, slightly glaucous. Leaves broad, rounded, entire, or almost entire. Wood large, color hazel, internodes of medium length. Plants all sterile.

Leaves without the least coloration of red in the autumn, completely smooth on the lower side, and even on the edge, A.

Leaves do not turn red in autumn, or only very slightly so; pubescent upon the large veins of the lower surface, also on the edge, 3-5 lobes, A.

Leaves highly colored with red, pubescent upon the large veins, on the lower surface, also on the edge; internodes attaining 0.78 inches more in length than the preceding plant, B.

All these diagnoses have been made in the south the last of September, upon the mother stocks themselves.

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BRANDY DISTILLATION.

APPENDIX A

TO THE

BIENNIAL REPORT OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS.

FOR 1891–1892.

IN TWO PARTS.

SACRAMENTO:
STATE OFFICE, : : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1892.

LEAF OF FOLLE BLANCHE

H.S. CROCKER CO. S.F.

LEAF OF FOLLE BLANCHE

FOLLE BLANCHE

H.S. CROCKER CO. S.F.

Anal.

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WINFIELD SCOTT, Secretary .... San Francisco.

CLARENCE J. WETMORE .... Livermore and San Francisco.
Chief Executive Viticultural and Health Officer.

Office of the Board:
317 Pine Street, San Francisco.

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PART II.

COGNAC DISTILLATION AND MANUFACTURE.

(A translation from the German, of a work by Antonio Dal Piaz.)

INTRODUCTION.

Brandy production in California is now recognized as one of the leading branches of the viticultural industry. Its importance has assumed such proportions that this Board has deemed it imperative to publish a work on distillation, supplemented by the translation of one of the best foreign works on the subject. The American market for brandy within the past few years has passed into the control of the distillers of this State, and large shipments are now made to Germany and England. It is therefore to be expected that the production of brandy will constantly assume greater relative importance until there shall be a general replanting of wine grape vineyards in the State, which would be brought about by a season or two of prosperity.

WINFIELD SCOTT,
Secretary.

CHAPTER I.

HISTORICAL AND STATISTICAL.

The Mission Fathers, who introduced the grapevine into California, and who made wine for their own use, undoubtedly practiced distillation on a small scale, and it is impossible to say with whom the name of setting up the first still rests. As early as 1835 the late Gen. M. G. Vallejo had a still working on his place in the Sonoma Valley. It was a very small affair indeed, made of copper, and having a capacity of, possibly seventy-five gallons. But brandy was not made in any quantity, nor was there much distilled until after 1858, when the State Agricultural Society published in its annual report the articles which led to the extension of viticulture in every branch.

This report mentions as distillers at that time A. P. Smith, of Sacramento; Thompson Bros., Agoston Haraszthy, and Gen. M. G. Vallejo, of Sonoma; and, in the southern part of the State, the Los Angeles Vineyard Society, Sainsevain Bros., Don Manuel Requena, Kohler & Frohling, Matthew Keller, and Hon. B. D. Wilson. It was about this time, too, that George West began distilling on a small scale at Stockton, and Charles Krug started a still in the Napa Valley at a somewhat later date. General Naglee and the distillers of the Santa Clara Valley were of a later date than those of Sonoma and Southern California.

At that early time the most rapid progress was made in the two sections just mentioned. As early as 1863 William Hood, N. Carriger, and Krohn & Williams had joined the ranks of the Sonoma distillers, and L. J. Rose, and others almost equally well known, were working in the south.

Most of the brandy produced in Southern California in those days was used in the manufacture of sweet wines. Practically all made in the State was from pomace or wash. Wine was too valuable then, and commanded too ready a sale as such to go to the still. In 1867 the first brandy in commercial quantities was made from wine by Agoston Haraszthy. That year he made ten thousand gallons, which was sold to Tillman & Bendel. The following year he contracted for ten thousand gallons to Kohler & Frohling, and had delivered part of it when his distillery burned. General Naglee was also among the early distillers who used wine, but with him distillation was a special fad as well as a commercial venture.

Small real progress was made all through the 70's. The prosperity of the distillers went hand in hand with that of the wine makers. The Mission grape was still supposed to be *the* grape for all purposes, and up to as late as 1884 most of the brandy was made from wash or from the pomace direct.

Stimulated by the earlier reports of this Commission, grape growers all over the State began (about 1881) to set out experimental plots of vines, such as Folle Blanche, Colombar, and other accepted varieties. A noticeable improvement in the brandy produced was the result, and

from that time to this the average quality of the distillates of the State has steadily risen. It is no longer doubted that with the finest varieties of grapes from the Charentes, and with careful distillation, the quality of the product will compare favorably with that of any country. This was amply demonstrated at the Paris Exposition of 1889, where this Commission was awarded a gold medal for some brandy made from Folle Blanche grapes grown in the Livermore Valley, fermented by the Commission in its experimental cellar, and afterwards distilled in a copper kettle still by Clarence J. Wetmore, then manager of the experimental cellar.

It was not until 1887 that any particular attention was given to the foreign market. About that time Messrs. Walden & Co. commenced distilling at Geyserville, with the object of producing a type of brandy suited for the foreign trade. Since then others have done the same, and there is now a regular and steady export trade to European countries, particularly to the United Kingdom and Germany.

The future of distillation seems bright. With the home market in hand, with a foreign trade rapidly growing, with the benefit of the Sweet Wine Bill, the distillers are in a situation to profit. There are certain governmental restrictions which tend to retard the growth of the industry, which should be removed. The bonded period should be made indefinite, or extended to five or seven years, and the producers should have the right to change their packages and to bottle their brandies in bond.

On this latter privilege Mr. Arpad Haraszthy, in his report in 1887, says: "It is a very great drawback to the brandy trade of our State that such privilege is not conceded by the Federal Government. Were we permitted to bottle our brandies in bond an enormous trade would spring up in foreign countries, especially those of Central and South America, Mexico, the Sandwich Islands, China, and Japan. These countries could thus also secure our brandies in their absolute purity, and would not be slow in their appreciation of that fact and make the most of it, both for ordinary as well as medicinal use."

There are other legislative measures which could be passed without detriment to the revenue, and to the assistance of the distillers, but these three may be taken as the chief.

The production of brandy has developed most rapidly since 1886, increasing threefold since that time. There appears no limit on the production, except the inability of distillers to obtain a sufficient quantity of material to work upon, at a price low enough to insure profitable operations. To insure this, those vineyardists who have low lying valley vineyards which will produce from five to twelve tons of grapes per acre, should be encouraged to plant the free-bearing accepted cognac types of vines; and the brandy business with them should be made a specialty. It is hardly to be expected that in the next two or three years there will be an increase in production at the same ratio as has prevailed during the past five years. There is every indication of a buoyant wine market in the immediate future, while since 1886 the distillers have had every advantage in the way of purchasing good wines at low prices.

Through the courtesy of Hon. John W. Mason, Commissioner of Internal Revenue, the following Government statistics of grape brandy

production in California are published. Prior to 1864 no classification of brandies was attempted. The official record of production is:

Fiscal Year Ending June 30—	Proof Gallons.
1865	20,415
1866	74,773
1867	47,303
1868	152,418
1869	286,753
1870	169,791
1871	157,107
1872	211,916
1873	118,605
1874	99,680
1875	297,147
1876	142,799
1877	157,159
1878	318,071
1879	158,393
1880	238,928
1881	351,206
1882	502,513
1883	324,717
1884	295,039
1885	383,756
1886	402,121
1887	742,445
1888	953,580
1889	915,573
1890	1,072,957
1891	1,475,525

It is interesting at this point to give the statistics of the exports of brandy from the State for a series of years, taken from the official records of this Commission. They have been as follows:

To New York—By Sea.

Years.	Cases.	Gallons.	Value.
1875	74	49,352	$111,041 00
1876	----------	37,365	84,071 00
1877	6	64,378	144,850 00
1878	6	84,794	190,786 00
1879	----------	95,608	205,118 00
1880	7	95,911	215,799 00
1881	1	58,036	129,495 00
1882	7	43,368	96,379 00
1883	7	34,362	79,681 00
1884	7	18,328	41,878 00
1885	----------	11,169	25,027 00
1886	2	19,173	37,702 00
1887	----------	34,710	67,413 00
1888	----------	54,812	82,218 00
1889	----------	214,163	321,245 00
1890	80	228,037	353,294 00
1891	39	319,203	611,918 00

To All Foreign Ports—By Sea.

Years.	Cases.	Gallons.	Value.
1875	11	165	$492 00
1876	12	121	392 00
1877	....	25	75 00
1878	71	896	2,327 00
1879	76	2,904	6,375 00
1880	399	767	4,074 00
1881	418	1,577	4,916 00
1882	81	1,480	3,069 00
1883	609	709	5,164 00
1884	798	579	6,460 00
1885	216	2,647	4,865 00
1886	394	3,927	9,786 00
1887	639	26,899	36,154 00
1888	263	30,308	21,450 00
1889	320	82,102	75,697 00
1890	356	75,220	69,827 00
1891	375	174,523	134,422 00

Brandy Exports by Rail.

Years.	Gallons.
1875	2,394
1876	23,092
1877	74,952
1878	37,875
1879	68,388
1880	91,565
1881	149,584
1882	169,410
1883	196,109
1884	202,934
1885	250,128
1886	238.335
1887	412,180
1888	365,960
1889	294,000
1890	296,840
1891	*305,886

*And 1,225 cases.

Total Brandy Exports out of the State.

Years.	By Sea, Gallons.	By Rail, Gallons.	Total Gallons.
1875	39,924	2,394	42,318
1876	36,901	23,092	59,993
1877	64,940	74,952	139,892
1878	91,324	37,875	129,199
1879	95,504	68,388	163,892
1880	97,533	91,565	189,098
1881	60,093	149,584	209,677
1882	44,752	169,410	214,162
1883	35,194	196,109	231,303
1884	18,969	202,934	221,903
1885	13,712	250,128	263,840
1886	22,430	238.335	260,765
1887	60,572	412,180	472,752
1888	85,120	365,960	451,080
1889	296,265	294,000	590,265
1890	303,257	296,840	600,097
1891	493,726	305,886	*799,612

*And 1,639 cases.

To show how the German and English trade has grown during the past four years, the following tables have been prepared from official statistics:

	1888.			1889.		
	Cases.	Bulk Gals.	Value.	Cases.	Bulk Gals.	Value.
To England	....	3,166	$1,362	....	41,658	$55,620
To Germany	....	18,510	11,232	....	26,377	14,992
Total both countries	....	21,676	$12,594	....	68,035	$70,612

	1890.			1891.		
	Cases.	Bulk Gals.	Value.	Cases.	Bulk Gals.	Value.
To England	2	19,267	$9,694	3	58,449	$40,918
To Germany	....	46,612	29,307	2	102,763	79,160
Total both countries	2	65,879	$39,001	5	161,212	$120,078

WINFIELD SCOTT,
Secretary.

CHAPTER II.

GRAPES SUITABLE FOR FINE BRANDY.

At the present time there are upwards of forty different varieties of grapes planted in the State from which brandy has been made, producing an article of many different grades, for no two varieties of grapes will produce exactly the same quality of brandy. In fact, the same grape grown in different sections will produce a brandy similar in characteristics, but different in quality. Up to the present time there has been no one locality planted to grapes for the express purpose of making fine brandies, and consequently it has been difficult to obtain large quantities of exactly the same quality of brandy. Every large wine maker has a distillery connected with his winery, and makes more or less brandy. When the price of wine is high the brandy is made from wash or spoiled wine; when the price is low, good wine is converted into brandy, and the quality is therefore better. A few of our distillers have always made their brandy from good wines, and have built up a reputation for their products both here and in foreign countries. During the past three or four years the price of wine has ruled low, and the result has been more brandy of good quality and an increased demand from foreign countries. To keep up this demand, which comes principally from England and Germany, a first class quality of brandy must be made, for those two countries will not take a poor article. Distillers who are looking for this foreign trade should bear this in mind, and if they have not the proper grapes for making high-grade brandies, they should either plant them or buy them from vineyardists who grow them.

It is well known that high-grade brandies can only be produced from good, sound, white wines; therefore, the selection of the proper grapes to produce such brandies is an easy matter. As the finest brandies known to the world have come from France, we naturally look to that country for the varieties of grapes that produce them. In the Charente District, where the celebrated cognac is produced, the Folle Blanche and Colombar are the principal grapes planted. These same varieties have also been planted in this State, and the brandy produced from them resembles very much the cognac of France. The only gold medal awarded to California for brandy at the Paris Exposition, in 1889, was for one made by the Commission from the Folle Blanche grape.

In making a selection of grapes for a brandy vineyard, where quality is looked for, I would place at the head of the list the

FOLLE BLANCHE.

This variety is without doubt the king of brandy grapes, and wherever it has been cultivated in this State, and brandy made from it, the product has been exceptionally fine. The grape was imported from the Charente District by Mr. Pellier, of Santa Clara County. Through the

endeavors of Mr. Chas. A. Wetmore, who indorsed its widespread introduction in 1882 and 1883, the grape is now to be found in nearly every wine-producing section of the State. It is a good bearer with short pruning, and ripens its fruit well in most places. In the Charente District in France it does not ripen well, and the wine made from it is therefore distilled. On account of it ripening so well in this State, it is used more as a wine than a brandy grape. Distillers who are shipping their brandies to Europe have of late discovered the value of this grape, and more of it will hereafter be used in the manufacture of our brandies. A picture of the grape appears in the front part of this work.

Another grape that plays a prominent part in making fine brandies is the

COLOMBAR.

This grape is also a good bearer, and has been more extensively planted in this State than the Folle Blanche. It is used here almost exclusively as a wine grape. I have seen but few samples of brandy made from this grape, but sufficient is known to warrant its selection for brandy vineyards. If we wish to make brandies of true cognac type, it must be made from a blend of this grape and the Folle Blanche.

BURGER.

This grape is a better bearer on short pruning than either the Folle Blanche or Colombar, but in the bay counties it does not ripen its fruit well except in warm exposures or on hillside lands. This is no detriment as a brandy grape, for the finest brandies appear to come from grapes that are low in sugar. When grown on bottom land the Burger bears enormously, and is often used to correct the faulty fermentation of red wines. In the Second Annual Report of the Chief Executive Officer of this Commission, published in 1884, I find the following remarks relative to the qualities of the Burger grape for brandy purposes:

"For making fine brandy I believe the Burger is also destined to play another important role. In many respects it resembles the Folle Blanche, which is the leading grape of the cognac country. I believe that they are of one family. If I had a vineyard such as some of those in the bottom lands of St. Helena, where ten to twenty tons of grapes to the acre is not an uncommon yield, and where the quality of wine is often very poor, I should plant Burger, Folle Blanche, and Colombar—producing thereby a large crop of very light greenish white wine, which I would carefully distill, fully believing that the brandy I should make could only be surpassed in quality by the same method in some other similar place, where, perhaps, there may be more calcareous matter in the soil. If we are ever to make a fine reproduction of the highest type of cognac, such as was exhibited at our last State Viticultural Convention, the type of which is known as Grand Fine Champagne, we must certainly do it after the manner I have indicated."

WEST'S WHITE PROLIFIC.

This grape was introduced into this State by Mr. George West, of Stockton. The true name of the grape has never been known, but owing to its being such a heavy bearer at Mr. West's vineyard, it was given the name of West's White Prolific. It is a good bearer on rich soils, but on poor soils the crop is not satisfactory. The brandy made from this grape has a strong resemblance to cognac, and is much admired by those who have tasted it. This grape should be planted in all vineyards, if the soil is suitable, where the object is to produce fine brandies.

VERDAL.

In most places in the bay counties this variety ripens very late, and is planted almost exclusively for table purposes. In the warmer valleys of the interior it ripens its fruit well, and when converted into brandy produces an article of good quality. Being a very heavy bearer on short pruning, it would be a valuable grape for brandy vineyards.

There are other white grapes from which good brandies can be obtained, but the object of this article is to show only those grapes from which the finest types of brandies can be made, and the distiller of such brandies need not look outside of the above-mentioned grapes. If any section of this State will plant Folle Blanche, Colombar, Burger, West's White Prolific, and Verdal, and make brandy exclusively, that section will soon become known as the cognac district of California.

CLARENCE J. WETMORE,
Chief Executive Officer.

CHAPTER III.

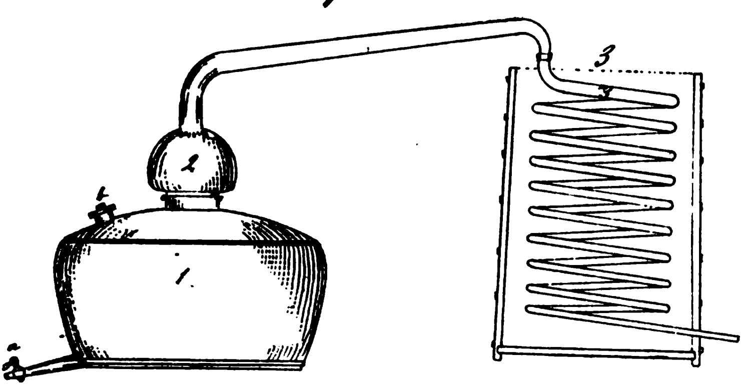
STILLS USED IN CALIFORNIA.

The stills at present made in California are from two manufacturers—Sanders & Co. and Ludwig Wagner, both of San Francisco—though stills of other descriptions are occasionally to be seen in the State.

THE SANDERS STILLS.

There are many different kinds of stills used in California and manufactured by us, but we will only speak of the best and those most used.

Fig. I



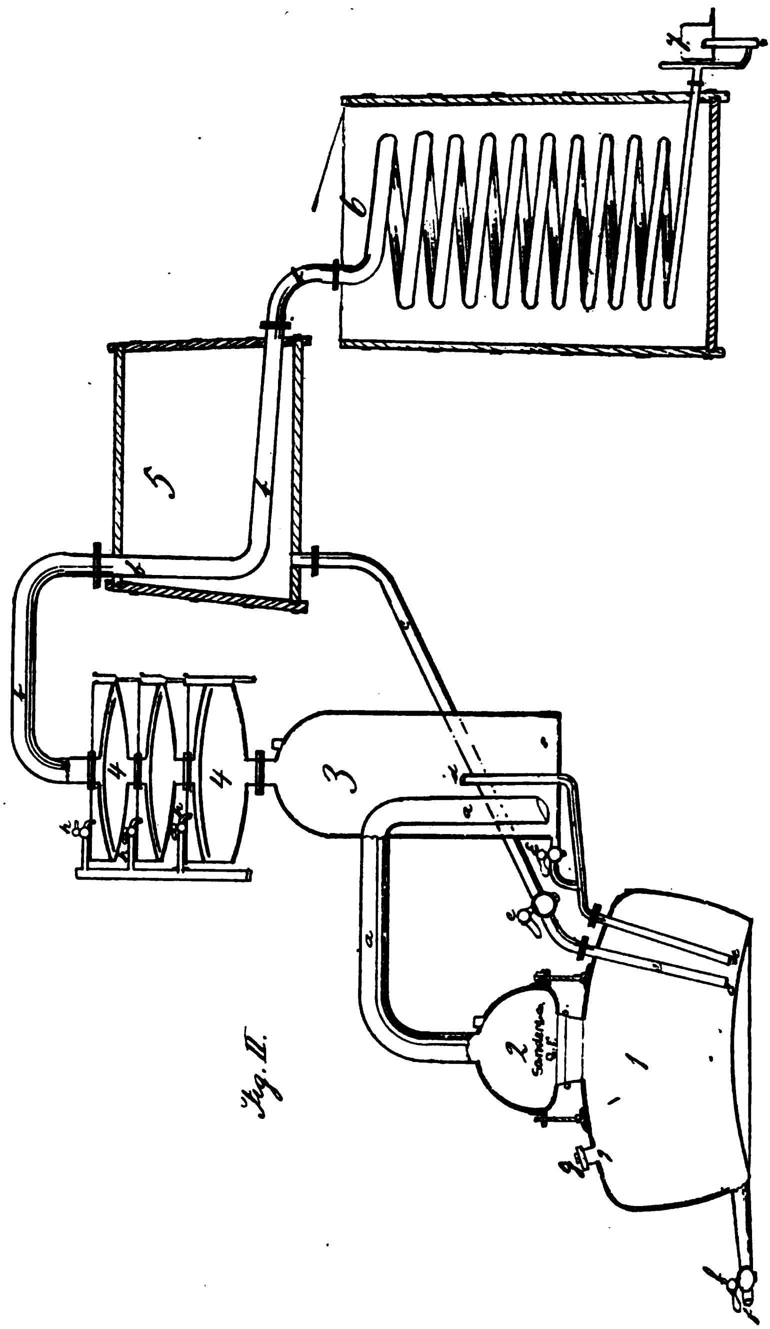
The simplest kind of still made and used is the one shown by Fig. I, consisting of: 1. Still; 2. Cap and pipe; 3. Worm.

The still, which is a closed vessel, is bricked in so that a fire can be built under it. Wine is placed in the still to boil; the vapor passes through the cap and pipe into the worm, which is a coil of pipe set in a tank filled with water, where it is condensed, and comes out at the bottom. At first the distillate contains a large percentage of alcohol, which gradually diminishes, and when it contains no alcohol the fire must be drawn from under the still and the still discharged by opening faucet *a* and new wine run in through the brass cap *b*.

As the vapor from the still heats the water in the worm tank, a continuous stream of cold water is kept running in the bottom of this tank, and the hot water drawn from the top.

The brandy thus made will be about 20 or 30 degrees below proof, and contains aldehyde and fusel oil, which must be removed from the brandy.

The aldehyde evaporates at a lower degree of heat than alcohol, and



therefore comes first, but the fusel oil evaporates at a higher degree than alcohol, and therefore comes out last.

To keep these from the good brandy, two receiving tanks are kept, one for the good brandy, and the other for the brandy containing the aldehyde and fusel oil—generally termed singlings—and which is redistilled.

To procure a marketable brandy, the product obtained with this still will have to be redistilled two or three times; and to save time, labor, fuel, and water, another kind of charging still is generally used, which is also made by us, and which makes good brandy on the first distillation. It is as shown in Fig. II, and consists of: 1. Still; 2. Cap; 3. Doubler; 4. Pans, which are used for the same purpose, but to accomplish this more fully cold water is run on them by opening the faucets *h*, the hot water running off on the other side; 5. Heater or charger, a wooden tank which is filled with wine, and a vapor pipe through it; 6. Worm; 7. Safe, into which a hydrometer is placed to show the proof of the brandy.

If steam is used instead of fire, a coil of pipe is laid on the bottom of the still, through which the steam passes, and thereby boils the contents of the kettle.

When the still is charged and boiling, the vapor goes through the cap and pipe *a* into the doubler and pans. Partial condensation occurs and the liquid gathers on the bottom of the doubler. The higher alcoholic vapor then passes through the pipe *b* into the pipe in the heater. There it heats the wine, and then it passes into the worm and comes out at the safe as brandy.

If a higher proof is desired, water is run on the pans. The liquid will gradually fill the doubler to the overflow pipe *d*, through which it is returned to the still. This liquid is called low wine. This low wine contains more alcohol than the wine which is in the still, and the vapors coming from the still keep it boiling in the doubler.

When the brandy in the safe shows about 10 degrees above proof it is run into the singling tank. The faucet *e* is also opened to drain the doubler, and when no more alcohol is coming the still is emptied by opening faucet *f*, and the charge in the heater run into the still through the pipe and faucet *c*. The wine now being nearly boiling, it requires only a short time for the brandy to come again. This still will make six charges in twenty-four hours.

Fig. III shows the style of still of small capacity, generally used in small wineries. Pomace can also be distilled with it, as it has a large outlet. A wooden tank is often used in place of the copper still, because it is cheaper.

Fig. IV shows another kind of charging still, called the double chamber still. Fig. IV shows a wooden and Fig. V a copper still. We have made both, but the majority of wood, because the outlay is not so large. It consists of: 1. Lower chamber; 2. Upper chamber; 3. Heater; 4. Doubler; 5. Pans; 6. Worm; 7. Safe; 8. Singling tank.

The heater is first filled with wine. This wine is run into the upper chamber by opening valve *a*, and the heater filled again. Steam is now turned into the still through pipe *k*, which fills the lower chamber and passes through pipe *d*, and boils the wine in the upper chamber. This pipe is arranged to keep the wine in motion. When the wine in the heater is hot, the wine in the upper chamber is run into the lower chamber by opening valve *b*. The charge in the heater is dropped into the upper chamber and the heater filled again. The still is now completely charged.

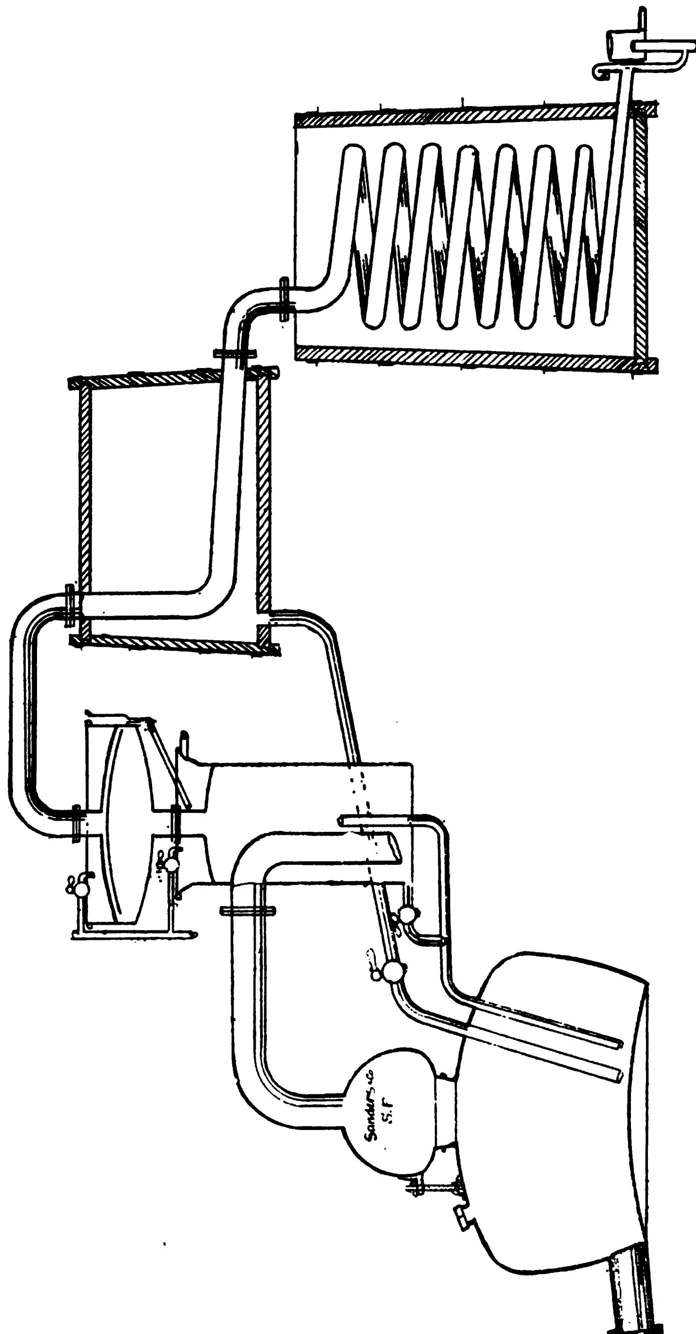
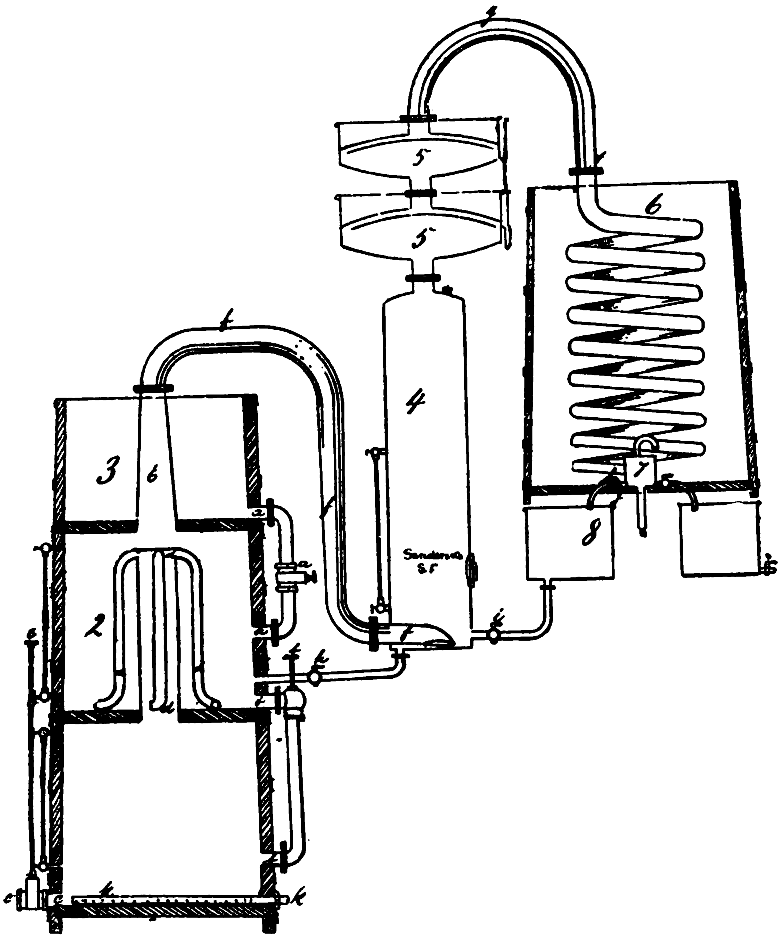


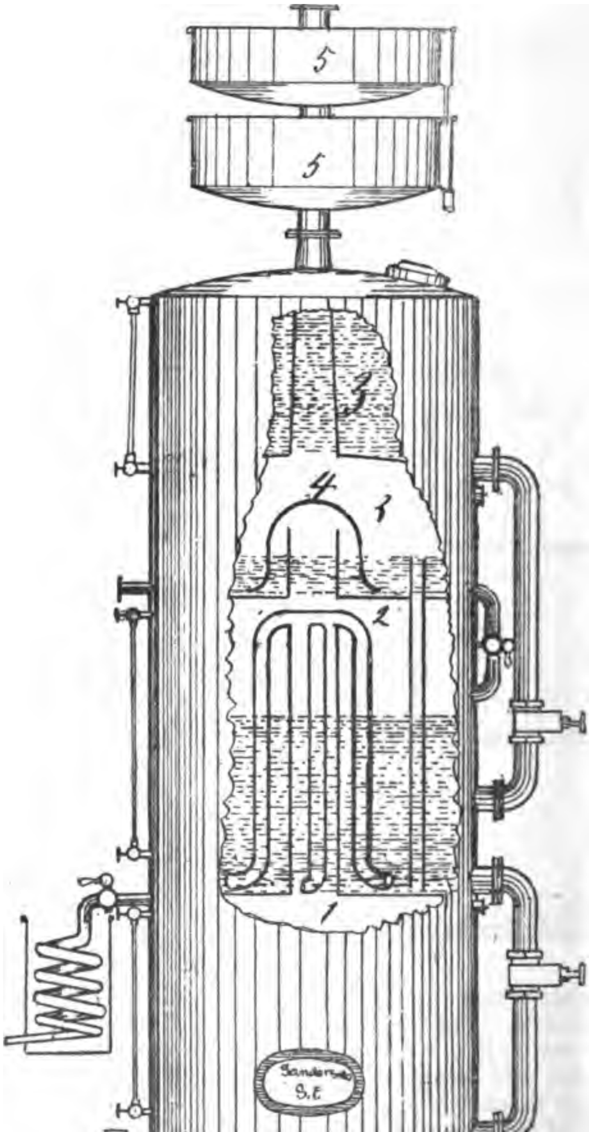
Fig. III

Fig. IV



The vapor rising from the lower chamber passes into the upper one and boils the contents. The alcohol having been partially boiled from the wine in the lower chamber, the vapor rising from it will condense in the upper chamber and throw out new vapor, which contains more alcohol. It then passes through the pipe *e*, heats the wine in the heater, and condenses some of the watery parts, which drop back to the upper chamber. Then the vapor passes through the pipe *f* into the doubler and pans, and through *g* into the worm; the distillate appears at the safe. If it is not high enough in proof, water is run on the pans as with the other stills. As soon as the brandy commences to run low it is run into the singling tank. When the alcohol is boiled out of the contents of the lower chamber, the chamber is emptied by opening valve *c*, and the charge in the upper chamber dropped into the lower one. The low wine in the doubler is now run into the upper chamber by opening faucet *h*, as

Fig V



well as the charge in the heater, and the heater filled again. The singlings in the singling tank are run into the doubler by opening faucet i. These singlings are always above proof.

The still is now ready for operation, and as everything is hot it will

only require a short while for the brandy to come again. It will distill twice as much brandy with the same amount of steam, and in the same time, as the other charging stills. A copper still, although costlier than the wooden one, is the best and cheapest in the long run, and one of these properly made will last a lifetime. Sometimes two separate stills with a heater are used and operated on the same plan, but the former style is preferred, as it is much cheaper, takes less room, and is easier handled.

Most all the California brandy has been made with these three kinds of stills. Some distilleries turn out better brandy with them than others. When the brandy is not good it is generally the fault of the distiller, who does not handle the still properly, or does not turn the brandy into the singlings at the right time. To avoid this we are now making a new kind of still, which overcomes these obstacles. It is called the

SANDERS IMPROVED CONTINUOUS STILL.

It makes more and better brandy, consumes less fuel and water, and is easier operated than the others. As this is something new, we have two cuts of it. Fig. VIII shows the inside, and Fig. IX the outside view.

The still consists of: 1. Still; 2. Heater; 3. Worm; 4. Safe; 5. Governor; 6. Residual tester.

The faucet *b* is connected with a tank, set high enough so it can be drained by it. Wine is pumped into this tank, which fills the governor through this faucet. As it is self-regulating, overflowing is prevented and the flow is steady.

To operate the still steam is turned on by opening the valve *a*. The valve *c* is opened to let the wine into the heater, which is filled to the overflow pipe *d*, through which it runs into the top chamber of the still *A*. This is filled to the overflow pipe *e*, through which it drops to the top boiling chamber *B*, and fills this to the overflow pipe *f*. The steam coming from below boils the wine. The vapor rises, and as the wine is continually flowing in, it drops and fills each chamber one third full, or to the overflow pipe. It eventually reaches the bottom of the still. As the contents of the lower chambers have already been boiled in the upper ones, the wine contains less alcohol the lower it drops in the still, and when it reaches the lowest chamber the alcohol is all evaporated, and the wine runs off through the outlet *g*. The principle is the same as turning steam into wine to boil it; the steam never appears again, but throws out the alcohol instead. The vapor thus thrown off in the upper chamber contains the highest degree of alcohol, which passes into the next two chambers *C*, which act as a doubler, where there is a partial condensation. The vapor then passes through the pipe *h*, heating the wine in the top chamber, thence into the coil in the heater, where it is condensed, and then into the worm to be thoroughly cooled. It then comes out as brandy at the safe. If a higher proof is desired, faucet *m* is opened; if higher yet, faucet *n*; and if high-proof brandy is required, faucet *o* is opened, because these faucets let the condensed parts or low wine run back to the still, through pipe *q*, where they are redistilled. The vapor in the coil does not only condense, but also heats the wine in the heater to nearly the boiling point, so much so that it will boil and evaporate in the top chamber of the still.

The vapor from this chamber and the heater goes through the pipe *j*,

and comes out at the bottom condensed. This being the first vapor from the wine, is therefore little else but aldehyde.

When distilling wash or wine with a small percentage of alcohol, and which, therefore, requires more heat to boil, and when boiling throws out less alcoholic vapor, the liquid will not always get hot enough to evaporate all the aldehyde it contains. Steam is then turned into the coil *l* by opening the valve *k*, which heats the wine and evaporates all the aldehyde.

When the wine reaches the outlet *g* in the lowest chamber it is forced up and out, as the cut shows, by the pressure inside the still, and is supposed to contain no more alcohol. To be sure of this, it can be tested. The wine drops into the pipe *z*, and the steam coming over with it from the boiling still, raises and condenses in the small worm. If tested it will then show the smallest percentage of alcohol, if any there is.

All this may look very complicated, but the working of it is very simple. Only two things need be looked after—the wine and steam, and as long as there is any wine in the tank it will always flow in the same, and as it takes a certain amount of steam to evaporate the alcohol from the wine, experiment will show the right amount of steam to be turned into the still. Once regulated, if the steam in the boiler is kept at an even pressure, the proof and brandy are the same as long as the still runs, without turning a valve.

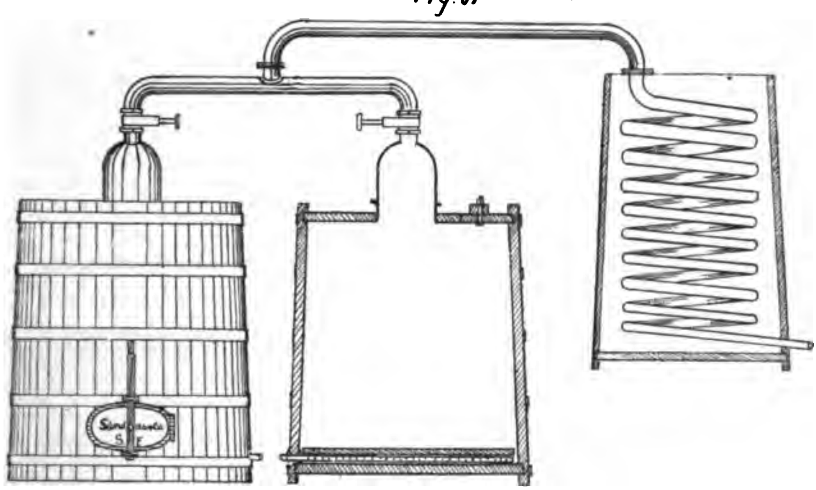
To stop distilling for the day no more wine is pumped, and the steam is turned off a few minutes later, thus leaving the charge in the still. The next day, after turning on the steam, the still will run again in a few minutes. As most of the dirt in the wine settles in the heater the still does not get very dirty and does not require cleaning often. If it is desired to clean it, water is run into the charging tank after the wine is out of it, and the still is fed with this water. The proof can be kept the same until the water reaches the still, when the hydrometer raises. The steam can then be stopped. The still and heater can then be washed by removing the brass caps, and the contents drawn off through the faucets *p*.

We have experimented a good deal with these stills; for instance, raising the proof of the brandy with water, but have found that it takes as much water as wine distilled to produce high proof; and not alone this, but also wastes the heat which remains in the wine.

It will pay to distill wash with 2 per cent of alcohol, because the still takes only a small amount of fuel, and the brandy does not need redistilling. This still will also produce more brandy out of the wine than a charging still, because it does not pay to use fuel when the proof is low in a charging still, and, therefore, 1 per cent is nearly always wasted. The brandy wasted in the charging still and saved in this continuous still will pay the cost of operation. As the wine does not boil long enough in the upper boiling chamber, no fusel can evaporate. The aldehyde is always forced out before it comes into this chamber, and the brandy, therefore, coming out of the safe is the best, and will surely help to make California brandy famous.

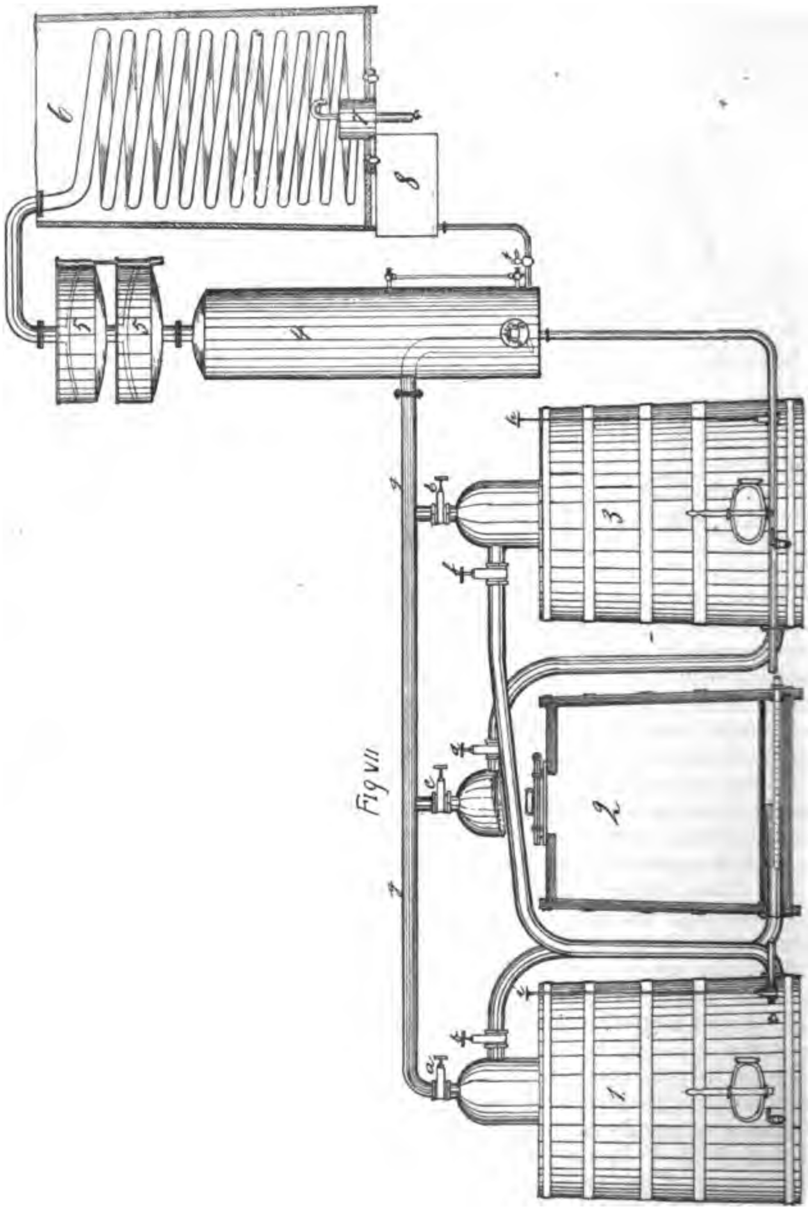
POMACE STILLS.

Fig. VI



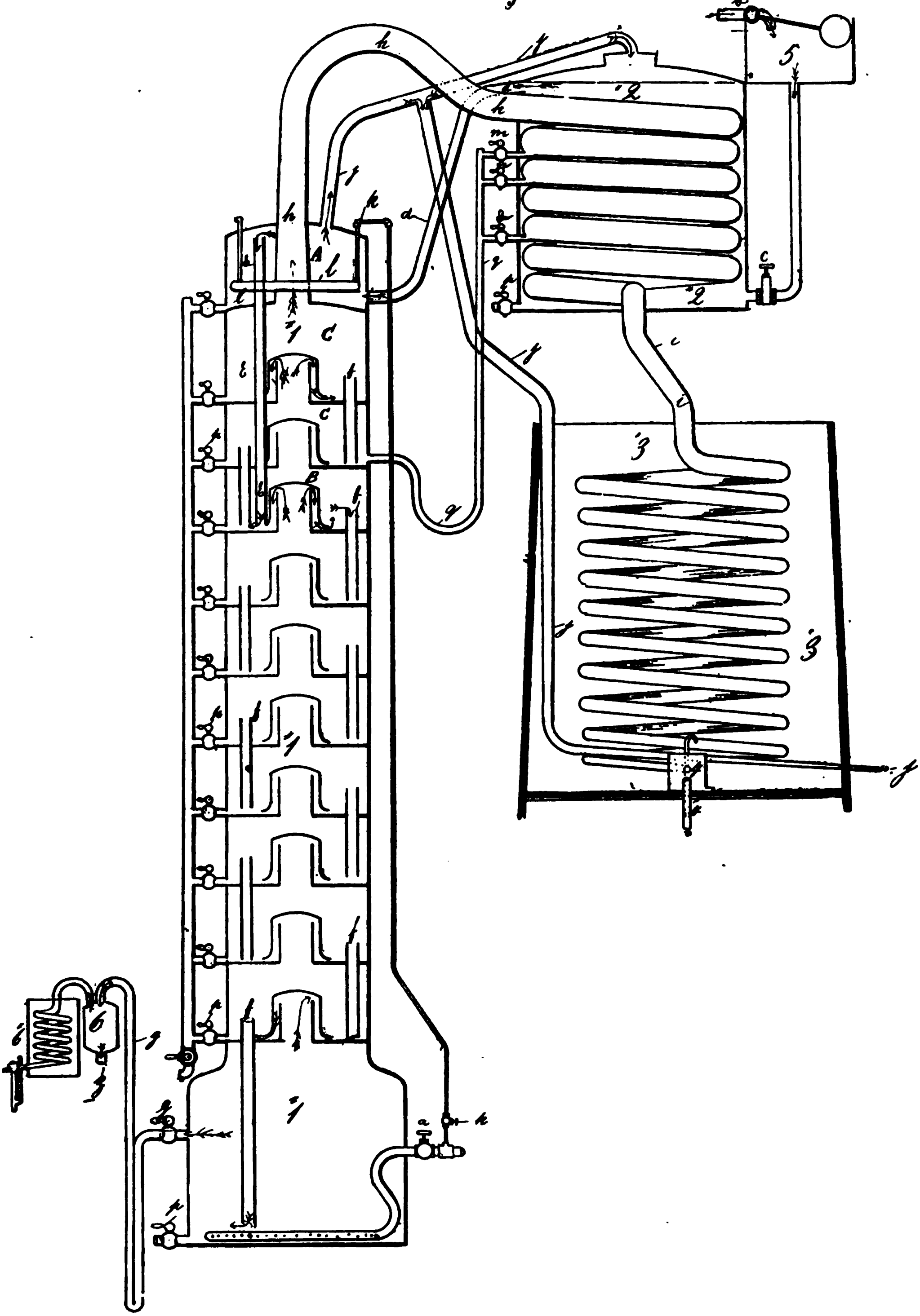
Pomace will produce a good brandy, which will always find a ready market, but it must be distilled properly. A good deal is wasted in the wineries where the pomace is thrown away without being distilled. Even washing and pressing does not take all the alcohol out, and will, if distilled, nearly pay the cost of wine making. A ton of wet pomace will make from twenty to twenty-four gallons of brandy, and a ton of pressed pomace or cheese will produce at least twelve gallons. The cost of distilling is not very much, so that the money received for the brandy is nearly clear profit. Fig. VI shows a still which has generally been used to distill pomace. It consists of two wooden tanks and a worm. In each is a steam coil into which the steam passes to boil the pomace, and a false bottom full of holes is laid over the coil. The tanks are filled through manholes at the top, and are discharged through an iron gate, which is on a level with the false bottom. While one tank is boiling, the vapor goes through the cap and valve into the pipe, and then into the worm to be condensed. The entire tank is cleaned out and refilled and heated with steam, thus keeping one tank in operation all the time.

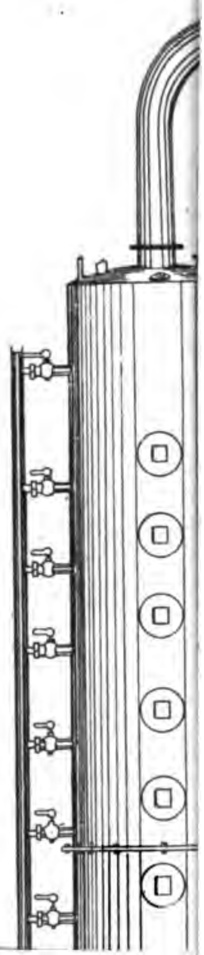
These take a good deal of steam and water. To save expenses we have devised an improved pomace still which will make the finest kind of pomace brandy without redistilling. As shown by Fig. VII, it consists of: 1, 2, 3. Tanks; 4. Doubler; 5. Pans; 6. Worm; 7. Safe; 8. Singling tank. The tanks are filled from the top and discharged at the bottom. A steam coil is laid in the bottom of each tank, a false bottom over it, and there is a faucet to draw off the water which is under this false bottom. When tank No. 1 is charged steam is turned in, which boils the pomace. The valve *a* is opened and the other valves closed, to let the vapor go through pipe *g* into the doubler. Steam is then also turned into tank No. 2, and when the contents in this tank boil the steam is stopped. Valves *b* and *c* are then opened and valve *a* closed, thereby forcing the vapor from tank No. 1 into tank No. 2, and boiling



the contents. This forces new vapor from this tank, which goes through *c* and pipe *g* into the doubler and pans, and to be condensed in the worm. While this is going on tank No. 3 is filled and heated with steam. When the alcohol is boiled out of tank No. 1 the steam is stopped and valves *b* and *c* are closed. Valves *d* and *e* are opened. The steam is also stopped in tank No. 3 and turned into tank No. 2. The low wine in the doubler is run into tank No. 3 by opening the valve *h*, and the sin-

Fig. VIII.





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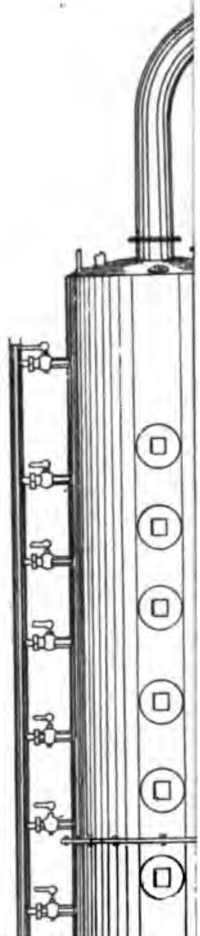

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glings in the singling tank are run into the doubler by opening the faucet *j*. While Nos. 2 and 3 are boiling, No. 1 is being discharged, refilled, and heated, so as to be ready and hot when the alcohol is boiled out of tank No. 2. Two tanks are operated at one time, but only the highest alcoholic vapor comes from them, and very high-proof brandy can be obtained. All the fusel oil is left in the singlings. To get all the brandy out of the pomace, and to make the tanks discharge easier, they are generally flooded with water. For this purpose the hot water in the worm tank is used, and is mixed with the pomace in the still. This saves a good deal of steam. The cost of operating these stills is very small in comparison with the other pomace still, and they will make the best pomace brandy.

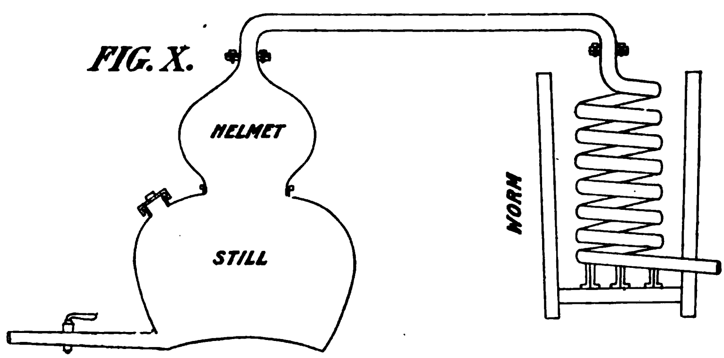
SANDERS & CO.

THE WAGNER STILLS.

Another favorite make of stills in California are those of Ludwig Wagner, of San Francisco.

Fig. X shows the simplest still used for making brandy. It consists of the usual copper kettle, with a helmet connected with the worm. The worm is in an ordinary wooden tank, and is immersed in water, which is kept constantly running. The cooling water is introduced into the bottom of the tank and flows out near the top. With

FIG. X.

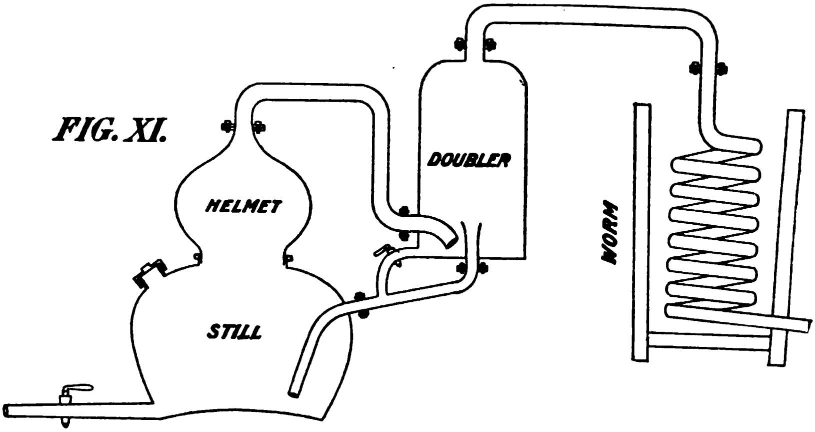


this still the middle run can be made as high as 160 degrees proof, and the fore and after runs (the singlings) should be redistilled.

Fig. XI shows the same still with a doubler. A partial condensation of the generated vapors takes place in the doubler, and the condensed spirit runs back into the still through the low wine pipe. The usual practice is to condense about half of the vapors in the doubler, permitting only the higher alcohols and ethers to go to the worm. If thought desirable these can be redistilled or subjected to fractional distillation.

Fig. XII is the same still with a heater or warmer. This warmer is made of wood, and is charged from the top. From the bottom a pipe runs to the still. The vapor from the still passes through a pipe through the heater before going to the doubler. This heats the wine in the warmer before it goes to the still, and enables the distiller to save

FIG. XI.



considerable time which would otherwise be lost if all of the heating had to be done in the still. The arrangement of the doubler and worm is substantially the same as in Fig. XI. There is also a vacuum valve on the pipe above the helmet which regulates the atmospheric pressure, and prevents any possibility of a collapse of the still.

All of these stills can be made for steam heating or direct firing. The usual custom in the small distilleries is to arrange for direct firing, but wherever steam can be had its use is to be advised, inasmuch as the operation of the stills can be regulated perfectly, and the still can be surveyed by the Government officials to better advantage. There is also less expense for attendance on the still, and in every way the use of steam will be found most satisfactory.

Fig. XIII shows a twin still, made by the same manufacturer. The cut is taken from the stills of Walden & Co., at Geyserville, and of the Natoma Vineyard Company, at Natoma. The two kettles *A* and *A'* are surmounted by the helmets *B* and *B'*. The pipes running from the helmets are both provided with vacuum valves *C* and *C'*.

The vapors on reaching the doubler *D* are partially condensed. When the condensed spirit reaches the level of the top of the low wine pipe *E*, it is allowed to flow back into the still again, the flow being regulated by the three-way cock *F*. The vapors which are not condensed in the lower part of the doubler *D* pass through the pipe *G* into the upper section of the doubler. When the still is running the vapors are again partially condensed, the lower volatile matters condensing out, and when the spirits reach the level of the overflow pipe *H*, they flow back into the lower section of the doubler. This is the second doubling which the still gives.

Those vapors which are not condensed in the upper section of the doubler then go to the becken *I*, which is immediately above the doubler. In the figure given there are two beckens; but the still can be made with any number desired. The action of the becken is practically to give another doubling, or refining. The vapors coming from the top of the doubler pass into chamber *K*, which, in the upper portion, about half an inch from the top, has a partition, or false top (or bottom). The vapors in rising must pass between this false top *L* and the real top *M*, which is concave in form from above, and is kept cool by water, for

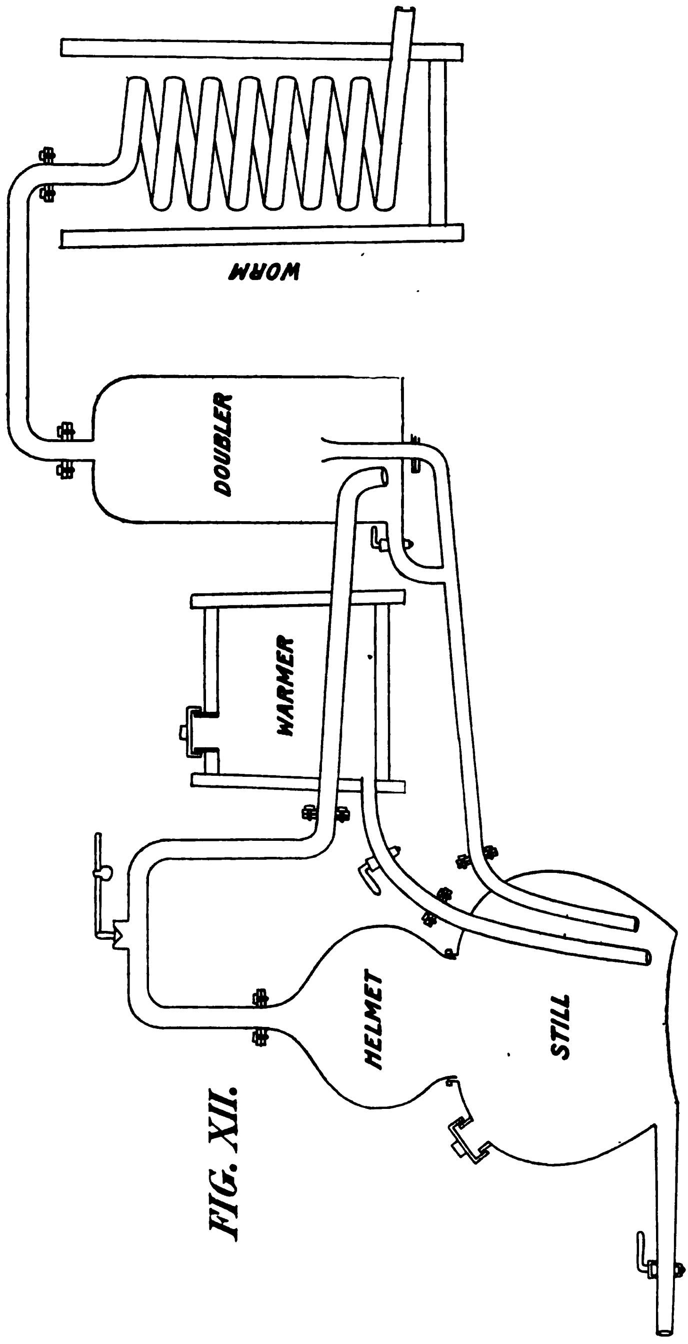


FIG. XII.

supplying and renewing which provision is made by pipes. The spirit condensed in the becken falls back into *H*. After the vapors have thus

passed as many beckens as the distiller desires to use, they are finally conveyed by the pipe *N* to the worm, which is supplied with the usual facilities for cooling. *O* is the receiver, which is supplied with the alcoholometer. *P* and *P'* are pipes for cleaning the parts of the still after distillation. *R* and *R'* are the discharges. The kettles are filled and cleaned through apertures *S* and *S'*, which are closed by caps when the still is in operation.

The stills of this sort must be operated by steam to insure regularity and satisfactory work. The steam heat is applied by a coil of pipe, which lays flat on the bottom of the kettle, and is not shown in the cut. The steam enters the coil at *T* and *T'*, and leaves at *U* and *U'*, which are at the same height on the kettle, but which are placed at different heights in the cut, so that both can be shown. Through the apertures *W* and *W'* a jet of wet steam can be introduced if necessary.

The stills are operated substantially the same as the ordinary kettle still. The two kettles are charged and discharged alternately, and when one is being discharged the steam is on at full pressure in the other. In practice a pressure of sixty-five to seventy pounds of steam is found to work best. These stills are substantially continuous, except for the time used in charging and discharging the kettle.

Fig. XIV shows the Wagner Improved Continuous Still, which is now in operation in several of the largest distilleries of California: I is the still or column; II is the doubler; III is the condenser which regulates the proof of the brandy, and IV is the worm. *A* is the inlet pipe for the wine; *B* is the pipe conveying the vapors to the doubler; *C* is the waste regulator; *D* is the warmer, and *E* is the cleaning pipe.

In the column of the still are eight compartments, each about one foot in height from the next one, with a larger condensing chamber above and a larger one below. These chambers are connected one with the other by overflow pipes, which will be seen in the cut, and also by check valves which open upward, also seen in the illustration.

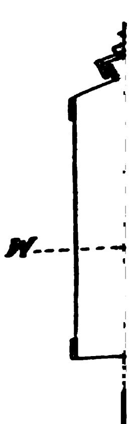
This prevents any liquor or spirits from flowing down from one chamber to the next, except through the overflow pipes, which extend about five inches above the bottom of each compartment.

The doubler is divided into two sections, which give two doublings in all—the same as in the doubler described under Fig. XIII. The condenser (III) is in an iron box, which is filled to any desired height with water. At the bottom of turn of this coil is an aperture which leads into the pipe and which enables any spirit condensed there to be returned to the doubler.

The still is operated by steam, which is turned on at the pipes *g*, *g'*, and *g''*, the last named being for wet steam. The steam passes through a coil lying on the bottom of the still, but which is not shown in the cut. Each chamber of the still has a hand hole *h*, through which the operator can look into the still.

In order to operate the still the wine is pumped through the heater *D* into the upper chamber of the column. When it reaches the level of the overflow pipe it passes into the next chamber below, and so on to the bottom chamber. Its height in this chamber is shown in the gauge *J*. Steam is now turned on, and at first the pumping must be stopped until the spirit begins to flow at the receiver *K*.

The vapors developed in the lower chamber by the steam pass up to the next chamber through the valves and meet the cooler liquid, where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a partial condensation takes place. This is repeated at each chamber, so that by the time the vapors have reached the top there has been, to all intents, eight doublings. The heavier volatile matters condensed in each chamber pass to the chamber next below through the overflow pipes. The vapors then pass through the pipe *B* to the doubler (II),

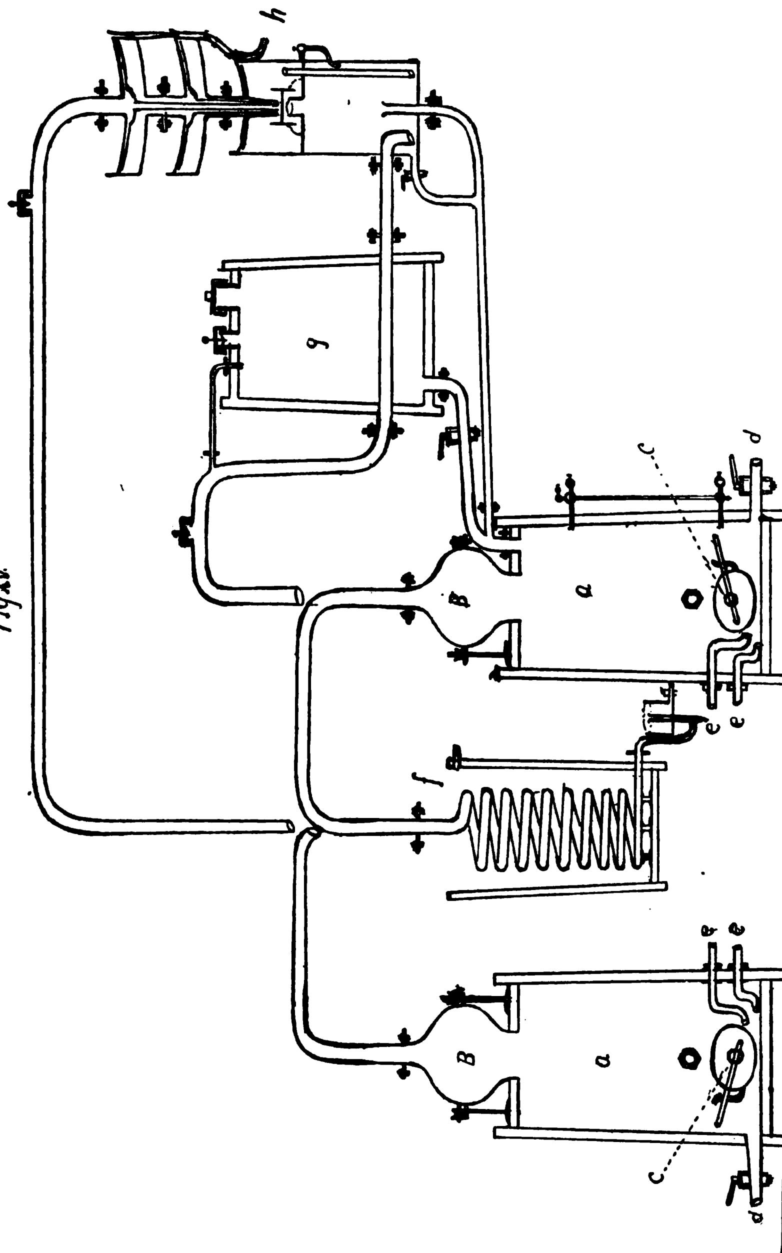


Fig. XV.

in which two doublings are secured, the same as in the doubler of Fig. XIII. After leaving the doubler, the vapors go to the coil in the condenser (III), where there is a further condensation at each turn. The vapors still left are finally condensed in the worm (IV).

After the still is in operation the process is continuous. Wine is continually pumped into the upper chamber, and the heated water and other refuse liquids come out through the pipe *m*, where they are utilized in warming the wine before it goes to the still. This effects a saving in fuel, expense, and time as well. Of course the wine can be conducted to the still by gravity instead of a pump, if convenient.

Stills of this sort can produce as high as 188 to 189 degrees proof, but in practice most distillers run from 165 to 175 degrees. The proof is regulated by the quantity of wine fed into the still—by the regulation of the height of the water in III, in the worm—and the quantity of steam turned in at *G*.

The try, or pet, cocks on the side of the still are opened when putting the still into operation, but are afterwards closed, one after the other, as the vapors rise from chamber to chamber. The still is cleaned through the valves connected with *E*. These valves enter the still at the bottom of each chamber.

The still is built in sections, to permit of ease in repairing and handling, or for transportation. As with other continuous stills, there are no singlings, and the distillation is begun and completed at one operation. The still can be used for redistilling if desired.

Fig. XV represents a wooden pomace still, made by the same manufacturer. *a* and *a* are the wooden heaters or boilers, the capacity of which may vary up to one thousand gallons or more, to the convenience of the distiller. The charging is done through the top by an arrangement which permits the shifting of the helmets *b* and *b*. The discharging is done through the manholes *c* and *c* and the discharge pipes *d* and *d*, the manholes being for the solid pomace and the pipes for the liquids. The heating is done by steam, which is admitted and discharged through *e* and *e*, and when in the boiler passes through a coil which is on the bottom of the tank, but which is not shown in the cut. The coil is protected from contact with the pomace by a false wooden bottom, which is perforated. This bottom enables the distiller to clean the pomace from the tank when discharging the exhausted pomace, and also does not interfere with the free passage of heat. The helmets *b* and *b* are of copper, and are connected with the worm *f* by copper pipes. The still is also provided with a fore warmer *g*, and doubler *h*, which, however, are not used except in redistilling, and are worked on the same principle as the twin still described in Fig. XIII.

In operating it is advisable to produce at first a low-proof brandy from the pomace. The tanks are charged and discharged alternately while working on pomace. When redistilling but one tank is used, the principle being the same as operating a single still with a fore warmer, doubler, and becken. Any proof that is desired can be obtained on redistillation.

LUDWIG WAGNER.

CHAPTER IV.

HOW TO ESTABLISH AND CONDUCT A DISTILLERY.

Being an Address at the Sixth Annual Viticultural Convention, by CAPT. H. W. McINTYRE, Manager of the Vina Vineyard, Cellars, and Distillery.

CAPTAIN McINTYRE: In the assignment or choice of subjects to be considered during the present week, it has fallen to my lot to address you upon the "Distillation of Grape Brandy." This subject has received scant attention in our viticultural assemblies or conventions; hence, of necessity, those desiring to engage in this business have been obliged to "pick up" information as best they could, and too often, as was the case with wine making a few years ago, the answer to inquiry has been a shrug, and the intimation that the work is intricate and mysterious, its practical part hard to acquire and harder to impart; or, on the other hand, the reply may have been: "Why, anybody can run a distillery; and as to the material to be used and its preparation, it doesn't matter; brandy is brandy anyhow."

In either case, whether the selfishly secretive or the inconsiderate, such reply is to be deprecated, for it is only by careful attention to the details of our work, and information freely and fully imparted, that we can hope to make the name of California grape products synonymous with the utmost purity and excellence.

I do not, at this time, expect to interest, much less to instruct, those whom years of practice have made expert in the work, but simply to aid the beginner by suggesting modes of procedure which may be adopted in the outset, and, it is hoped, improved upon by time and experience.

During the process of fermentation in wine making, a portion of the grape sugar is converted into alcohol, which, as it differs materially from that produced from grain or potatoes, we will term grape spirits. There are various other substances also evolved by fermentation, and in our work of distillation we desire to separate these substances one from the other, retaining with the spirits some others necessary to the better development of the brandy, and especially a certain volatile oil, the presence of which, in proper proportion, is absolutely requisite to impart that delicate flavor which marks the excellence of the product; we also desire to reject the amylic and other alcohols, which, with the fatty acids, as capric, formic, etc., constitute what is known as fusel oil.

When alcohol is burned very slowly, and with little air, another substance is formed known as aldehyde. This is of pungent flavor, and possesses a suffocating and disagreeable odor. Aldehyde is always found in sour, or "pricked" wine, and from the product of such material it must be eliminated.

The boiling point of absolute alcohol is 173 degrees Fahrenheit, but when mixed with water the degree of heat required rises in proportion to the increase of the volume of water contained in the mixture; in case of wine the boiling point is about 183 degrees. Fusel oil boils at about

67 degrees, and aldehyde at 69.5 degrees. The boiling point of these substances, as well as of water at 212 degrees, is fixed with reference to ordinary atmospheric pressure, as in an open vessel and at sea level. When alcohol is placed under the exhausted receiver of an air pump it will boil at 60 degrees, or at ordinary temperatures.

In the material from which we propose to make grape brandy, which is simply wine in some form, as whole and "sound," or "pricked," or diluted with water, and known as "wash," all the substances before named (with others not necessary to enumerate) exist, and, in construction of an apparatus for distilling, we have to deal chiefly with their boiling or vaporizing point.

I do not propose, at present, to discuss the merits of any particular form of distilling apparatus; they are many, and for each is claimed some point of superiority.

In speaking of material for the construction of the still, I simply mention those things which are most commonly used at present. The simplest form consists of three essential portions: First, a retort, known as the "still," which is simply a closed vessel of copper or wood, surmounted by a copper dome, or cap, of suitable size. And here let me say, be sure to make the cap a little larger than is absolutely required, as a small outlay for copper and labor will be more than repaid by having a large vapor space above the boiling liquid. Second, a vapor pipe, to be attached to the cap and prolonged to form a condensing tube, usually in form of a spiral; and, third, a vessel of wood to contain cold water, through which the condensing tube is made to pass.

If now we place in the retort a portion of wine, or other material, and apply heat by steam or furnace, we shall find that, as the temperature of the mass is raised, watery vapor will pass over through the condenser, containing, with other substances not necessary to mention, aldehyde, spirits of wine, and, finally, water containing fusel oil and other impurities. We will note that these substances have come over in the order of their respective boiling points, from lowest to highest. This simple distillation is now complete, and we have a product known as "singlings," and very poor singlings at that, because we failed to remove the first portion, containing aldehyde and other matter boiling at low temperature, and the last portion containing fusel oil, etc., all known as "faints." But had we, as we should have done, removed the faints, the singlings would still have contained many impurities, to remove which it is necessary to redistill, or "double" them; when, by carefully removing the faints, we may secure the middle product or grape spirits.

It should be noted that, if expert and careful, we might have secured, just at the right time, a small portion of brandy, which would have contained the largest possible amount of the volatile flavoring oil before mentioned, and should, doubtless, have called the brandy very "fruity," and, perhaps, if kept several years, of first quality.

Query by Mr. H. R. Schell: At what time or degree of alcoholic strength would you cut off?

Captain McIntyre: It depends on the quality of the work. The distiller's nose can be his only guide in this matter. It is a question that can be only determined by the quality of the material you are using. He may base it more or less on the quality of the material being used. If it is weak he will cut off sooner; if it is strong material it can be

carried for a long time. This mode of procedure is too slow to be practical, except for small quantities; and the distiller must be quite expert to determine just when the portion to be kept as brandy should be run out, or separated, from the faints first produced, and the singlings and faints run later. This process is also expensive in the matter of fuel and time, as the material must be raised from ordinary temperature, say 55 to 65 degrees, to the vaporizing point, or 180 degrees, by direct application of heat, none of which can be recovered subsequently.

To remedy these defects various devices and appliances are employed, which merit attention. They are all to be added to the apparatus already described. Among them we note the following: First, the "charger," which is simply an open vessel, which may be of wood, placed considerably higher than the still, with which it is connected by a pipe leading from the bottom of the charger to the top of the still; this pipe should be furnished with a stopcock so placed as to be conveniently accessible, and the overflow pipe should connect with the charger near the top, and run to the vat with which the suction pipe of the feed pump is connected. This is simply to avoid loss in case of the mass becoming warm, increasing in volume, and running over; by putting in the overflow pipe it can be pumped up. The size of the charger (here is an important point in the matter of your account with the Government) should be such that, when filled up to the overflow pipe, it will contain just the quantity of wine, or other material, which may be boiled in the still at one time. Want of attention to this point has been frequently the source of trouble and vexation. If it is too small, that is to say, if the overflow pipe is placed too low in the charger, you have not enough material to enable you to obtain the quantity of brandy which will be required by the Revenue Department for a single boiling. Then it must be raised; but on the other hand, if you have a large charger, and the overflow pipe is placed near its top, and the surveyor finds that the charger is so large that you have a chance to put in more, you will either have to cut that down, or he will base the charge on the capacity of the still, giving you no opportunity for uniformity of operation. Hence, there is a necessity for having a charger of the right size.

Query by MR. SCHELL: The top of the charger is open?

CAPTAIN McINTYRE: It must be open, not absolutely closed, or it would be surveyed as a part of the still.

Query by MR. SCHELL: How if it should get so hot as to evaporate the brandy before it goes into the still?

CAPTAIN McINTYRE: I should advise the pumping up of the charge later, so as not to allow it to get too hot, although some stills are constructed with especial reference to that matter.

Second, the "doubler," which is a closed vessel, preferably of copper, cylindrical in form, and set somewhat higher than the still, with which it is connected by two pipes—called the "overflow" and "discharge," the latter being furnished with a stopcock. The vapor pipe before mentioned leads upward from the cap of the still, enters the doubler near its top, and is carried downward to a point near the bottom, where it is left open; then commencing at the top of the doubler, it is run somewhat above the top of the charger, into and through which it passes—sometimes curved to increase its length—to the condensing tank. In case it is desired to increase the strength of the spirits and remove more

of the impurities or volatile oil, the vapor pipe may be furnished with one or more enlargements in form of a shallow pan, upon the depressed top of which a small stream of cold water may be run, having inside plates deflected downwards at their outer edges. This is known as a "plate."

The manner of operation of this entire apparatus is as follows: The charger is filled to the overflow pipe with the material to be distilled; the stopcock in the lead pipe is then opened, and the "charge" allowed to run into the still; heat is now applied, and the vapor formed passes through the vapor pipe to the doubler, where condensation takes place simply by the coolness of the surrounding air. The liquid formed by condensation contains a much larger proportion of alcohol than the material in the still, and will, consequently, boil at a lower temperature. In a short time this temperature will be reached, and the vapor, containing much less of water and impurities than before, rises through the doubler to the "plate," where a part of the watery vapor is condensed; but the alcoholic portion, having higher tension, passes under the edge of the plate and into the pipe leading through the charger, which has already been refilled with new material. Here, in contact with the cool material, condensation is rapidly effected, and the heat is absorbed by the liquid, raising its temperature without cost, preparatory to its being run to the still. Passing from the charger to the condenser, perfect condensation takes place, and the spirits flow into the reservoir clean and pure. It should be noted that the first of the product condensed will contain considerable aldehyde and other impurities, which boil at low temperature. These should be rejected, and in no case allowed to mix with the pure spirits. These "faints" will possess a blue tint and very pungent and characteristic odor, which the distiller will soon learn to recognize, so as to be able to determine when the pure spirits, called "high wines," are running.

Every distillery should be provided with a hydrometer to indicate the strength of the spirits. It is probable that the spirits will commence running at about 80 or 85 degrees (equal to 160 or 170 degrees United States Custom-house scale), decreasing more or less rapidly as distillation goes on. It is quite likely that in the course of the process you will find that the vapor, as the spirits begin to run, will go over at an alcoholic strength of 86 or 87 degrees, beginning perhaps at 80 degrees, and then running up gradually as the "faints" come off, to the maximum of strength possible for the material in the still. An experienced distiller will carefully watch these changes, looking specially for a slight but rapid fall or decrease of strength, which is usually noted shortly after the maximum is reached.

At about this time it will be observed that the "faints" have all run off, and that the pure spirit only is coming over from the still. This may be allowed to run until the strength has fallen to 80 or 75 degrees, according to the purpose for which required, whether for pure spirits, for fortifying sweet wines, or for brandy; great care should be taken not to allow the process to go beyond the point of absolute purity, for it is better by far to cut off the run as "spirits," and make "singlings," which will go back as required for redistillation, or "doubling." The hydrometers can be purchased at any store. They are of different sizes, to suit the purpose needed. They are all adjusted for the taking of the specific gravity of the liquid.

Query by MR. SCHELL: How long do you run it?

CAPTAIN McINTYRE: It depends on the nature of the material. In making singlings sometimes I would stop at 25 per cent, sometimes at 10 or 5 per cent.

Query by MR. SCHELL: Why do you make that difference?

CAPTAIN McINTYRE: On account of the different quality of the material. When the strength has fallen to a certain point, according to the required average strength of the product, the high wines should be "cut off" and the remainder run as "singlings," until the blue tint and the odor of "faint" is noted, when the operation should be stopped and the residue discharged from the still. This being done, the warmed material in the charger may be run to the still, and the operation carried on as before. The singlings from the preceding charge may be run into the charger with the new material, or they may be reserved until the quantity is sufficient for a charge by itself, when they should be doubled. This matter, with respect to the report to be made to the Department of Internal Revenue, is considered elsewhere.

Another form of apparatus is that known as the double-chamber still. In this all the parts mentioned are retained, but another chamber is interposed between the still, as already described, and the doubler.

In construction the retort is divided into two parts by a diaphragm, which forms at once the top of the lower and bottom of the upper chamber. If made of wood, which, on account of cost, is preferred for this form, the staves are made sufficiently long to form the charger in a portion above the head of the upper chamber. This arrangement has the advantage that it requires little floor space. The charger is connected with the upper chamber by a large pipe provided with a valve outside, and the same arrangement is made with respect to the upper and lower chambers of the still. The vapor pipe, quite large, and in form of a "stand-pipe," starting at the diaphragm, and extending nearly to the top of the upper chamber; the top of this stand-pipe is closed; from its side near the top three smaller pipes, called "plungers," are carried downward to the bottom of the upper chamber, where they are bent slightly towards the horizontal, and also to the right or left, all in the same direction, in order to set the liquid in which they are submerged in motion, so that it may be heated equally and quickly in all parts. From the top of the upper chamber the vapor pipe is carried up through the charger, and thence to the doubler and condensing tank, as before described. It is operated as follows: The charger is filled with the material to be distilled, and this is run down to the lower chamber; the valve in the connecting pipe is now closed, the charger refilled, and the charge run into the upper chamber; heat is now applied by direct steam admitted through a perforated pipe to the lower chamber only; when vapor is formed it passes into the stand-pipe, and thence downward through the plungers to the bottom of the upper chamber, where it is discharged into the liquid contained therein. The alcoholic strength of this mass is rapidly increased by the vapor from the lower chamber, and its boiling point proportionately lowered; when this point is reached the vapor passes upward through the charger (which has, meanwhile, been refilled), warming its contents in passing, and thence to the doubler, plates, and condenser, as before. Let us note what has taken place: A large portion of the alcoholic strength of the contents of the lower chamber has been added to those of the upper chamber, lowering their boiling point, and consequently depriving the vapor of some of its

watery portion; with increased strength the vapor, passing to the doubler, is again condensed, and deprived of water and fusel; at the plates aldehyde, and other of the more volatile portions, are thrown back, so that when finally condensed there remains with the pure grape spirits such portion of ethers and volatile oil as will, by age, impart delicacy and flavor. As the vapor was first formed in the lower chamber, so the material therein will be first exhausted of its spirits; and when this is accomplished, which may be determined by means of a small test condenser attached, the waste, or "blow off" valve is opened, and the residue discharged. The contents of the upper chamber are then drawn to the lower, and from the charger a fresh charge is drawn to the upper chamber, as are also the singlings which have been accumulating in the doubler; the low wines from the preceding charge are now allowed to run into the doubler, and the operation goes on as before. The arrangement of pipes, valves, etc., is such that the operation of refilling requires little time, and, as no cold material except the low wines is introduced, the mass is soon heated, and the high wines again running.

It should be observed that by this method no singlings remain to be stored, thereby reducing the cost of cooperage and amount of space required; and also, that as each operation (except at the commencement and close of a season at a "clean-up") is complete in itself, we may know at all times whether the material is of requisite strength, and, generally, just what we are doing.

In another apparatus the several parts are so arranged that the boiling point may be lowered by creating a partial vacuum by means of an air pump applied for that purpose, thereby reducing the atmospheric pressure as desired. The use of the air pump is doubtless of great value as applied to distilling operations, especially when it is desired to produce nearly neutral spirits, as for making sweet wines.

The materials from which grape brandy may be produced are classified by the United States Internal Revenue Department as wine (erroneously called "must"), sour wine, wash, piquette, pomace, lees, and cheese. This classification relates to the estimated brandy-producing capacity of the materials named, which is assumed for the purpose of fixing the producing capacity of the still.

In order to obtain the best brandy it is necessary to distill pure wine only, and this must be from "must" fermented as for white wine. If fermented "on the skins," the wine becomes rough from tannin and other substances extracted during fermentation, and the brandy will be found wanting in that peculiar delicacy of flavor which characterizes the highest types. A good article may be obtained, however, from ordinary red or white wine, and also from any residue of wine contained in the pomace either before or after pressing. To the pomace of white grapes water should be added in the proportion of about eighty gallons to one ton of grapes, and the mass allowed to ferment. Warm water is preferable, as fermentation will start sooner.

The practice of distilling from the pomace and thick lees direct has been very wisely discontinued by nearly all brandy makers. The increased cost of handling and heating the mass of material is hardly repaid by the slight increase of product, which is of inferior quality and too often used for "stretching," by mixing with three or four times its volume of grain or potato spirits, to be sold as "pure grape brandy."

The better practice is to wash all pomace, lees, and cheese by

thoroughly agitating with water, which may be separated from the mass by pressing, leaching, or racking, after the heavier portion has been precipitated. By this method, the pure spirit is reclaimed with little loss, and the brandy made from wash so prepared will be of good quality.

In case of distilling sour wine, the acid should be neutralized by lime added a few hours before running to the still. We cannot expect to obtain pure brandy from every mass of foreign substance which may be placed in the still. The heat applied will form and cause to pass over with the spirit many substances which will impart to it a disagreeable taste or smell; hence, it will be found that the labor necessary for careful preparation of the material will be more than repaid by the quality of the product.

LEGAL REQUIREMENTS.

Every still must be registered. When the still is set up, the Collector of Internal Revenue must be notified of that fact, and he will then personally, or by deputy, survey the same and determine its capacity. This survey will show the full capacity of the still in gallons, and also all allowances for boiling space (in case direct steam is used), and for doubling. In some cases the survey is based upon the capacity of the charger, and this would seem to be the better practice, as much easier to be understood by the inexperienced distiller. The allowance for doubling is necessary in case spirits of low proof are to be made first, and afterward redistilled to get increased strength or improve the quality. This allowance for time or capacity for doubling is made as a credit in advance, to be used in determining the number of proof gallons which the still will produce in twenty-four hours. The survey will also fix the number of boilings which shall constitute a day's work—twenty-four hours being a "day" in all cases—together with the number of gallons of material, as wine, wash, etc., which is allowed for the production of onè gallon of brandy at proof.

It should be noted right here, in respect to the matter of day's work, that no fraction of a day will be allowed at the end of the month; that is to say, you may run any part of the day you please—the twenty-four hours round or any time necessary—but at the close of the month, when you make up your time, if you have twenty days and one hour, it will be charged in the Internal Revenue Department as twenty-one days. You get no credit. Hence, it is necessary to be careful in running toward the close of the month, so that the charges run during the month will make as nearly as possible a whole number of days. As it frequently happens that mistakes are made, and trouble and anxiety caused by not fully understanding this matter, I will try and illustrate by example. Suppose the still to be of copper, and of three hundred gallons actual capacity, and that direct steam is to be used in distillery. An allowance for "boiling space" must be made, because the volume of material will be increased by condensation of the steam introduced, as well as by expansion of the liquid from heating—the expansion amounting to about 5 per cent of the volume. In addition to this, there must be sufficient space to allow boiling without closing the lower end of the vapor pipe, and causing the liquor to pass over undistilled. Want of attention to this matter has ruined many a gallon of brandy. The allowance for boiling space we will suppose to be one tenth of the actual capacity of the still. Then three hundred gallons less

thirty gallons equals two hundred and seventy gallons, called "working capacity." Two hundred and seventy gallons then should be the capacity of the charger; but whether the charge of new material will be two hundred and seventy gallons (the working capacity), or one hundred and eighty-nine gallons (the actual working capacity), will depend upon how we wish to do the work. A charge of two hundred and seventy gallons of wine or other new material may be run for seven tenths of any month, and the product (singlings) doubled in the remaining three tenths, or a charge of one hundred and eighty-nine gallons—seven tenths of the working capacity—of new material may be used, together with the singlings from the preceding boiling, which will amount to about three tenths of the working capacity; and the result will be, as regards quantity, the same, so that only four charges per day can be run. Now, while you are doing this, you will be charged for full time, which is correct, for you have had credit for full time in the survey, the three tenths being allowed you in the start.

The allowance for doubling we will suppose to be three tenths of the above, or eighty-one gallons—two hundred and seventy less eighty-one equals one hundred and eighty-nine gallons, "actual working capacity." Probably six boilings or charges will be allowed as a "day's work." Then one hundred and eighty-nine multiplied by six equals one thousand one hundred and thirty-four gallons. Suppose this to be wine of which five gallons are allowed to make one proof gallon of brandy; then one thousand one hundred and thirty-four divided by five equals two hundred and twenty-six and eighty one hundredths, which is the brandy-producing capacity of the still from wine for one day of twenty-four hours. We will now see how this will verify for ten days. We charge the still with two hundred and seventy gallons of wine. Two hundred and seventy multiplied by six (number of boilings for one day) equals one thousand six hundred and twenty gallons of wine per day. By our survey, as above, the allowance for doubling is three tenths; then of our proposed ten days' run, only seven days can be devoted to distilling new material. At one thousand six hundred and twenty gallons per day this will amount to eleven thousand three hundred and forty gallons, from which we shall obtain about 25 per cent of the original volume, or two thousand eight hundred and thirty-five gallons of "singlings," the alcoholic strength of which will be proportionate to the original strength of the wine distilled.

These singlings must now be doubled, and the charge will be, as before, two hundred and seventy gallons; but on account of the greater strength of this material six hours will be needed for each charge, so that only four charges per day can be run. Two hundred and seventy by four equals one thousand and eighty gallons for one day, and at this rate it will require a little more than two and six tenths days for the original amount of singlings. But during this process of doubling some of the product is found to be wholly unfit to be allowed to run with the clean spirit, and this, in order to close the work without waste, must be doubled, which will require the remainder of the time—four tenths of a day—of our proposed run.

We have now made our trial of ten days, and by the Revenue Department shall be charged, as per survey, with ten days' work at two hundred and twenty-six and eighty hundredths proof gallons per day—two hundred and twenty-six and eighty hundredths by ten equals two thousand two hundred and sixty-eight proof gallons.

We have distilled eleven thousand three hundred and forty gallons of wine, five gallons of which would produce one proof gallon of brandy, and eleven thousand three hundred and forty divided by five also equals two thousand two hundred and sixty-eight proof gallons, showing that in this instance we have no "assessment for deficiency" to fear. It should be borne in mind that the above is applicable only to a copper still, the cap of which will afford sufficient vapor space to relieve the still in case of priming (foaming). With a wooden still, and direct steam, the allowance for boiling space should be greater in amount, fully equal to the increase of volume of wine by heating, plus the space occupied by the lighter parts of the mass, which, liberated by the heat, float as a scum, or foam, upon the wine, and which will be thrown into the vapor pipe when ebullition begins.

This matter of boiling space is one of great importance in the survey of the still. I would impress on every person commencing to run a distillery that, after the survey has been made and he commences operations, he should be very careful to ascertain whether he can run that still as indicated in the survey. If not, that fact should be reported without delay to the Commissioner of Internal Revenue, and a new survey asked for. If you cannot make the number of boilings—say if you are registered for six boilings every twenty-four hours—and you find it impossible to do that and produce a good article, say so, and not try to run under that survey or try to make up for it by making very strong material and other things that take up the time. Say you cannot do it, and have a re-survey at once. Re-surveys will be made as often as necessary, or some expert will come with the revenue officer to make the run and demonstrate to you how it could be run.

Remark by MR. SCHELL: I had a case something of that kind. It took me twenty-four hours and ten minutes to run four boilings, and yet they had assessed me with five boilings.

CAPTAIN MCINTYRE: Probably a matter of injustice was done at that time.

Query by MR. SCHELL: Do not the results, as a rule, fall below the surveys?

CAPTAIN MCINTYRE: Such has been my experience, as a rule.

Remark by MR. SCHELL: I don't think there is a case in California where a person can conform to the original survey.

CAPTAIN MCINTYRE: In regard to that I have to say that in the surveys made many years ago, the surveyors themselves were at fault, because they did not know how to do the work. But at the present time I think very little trouble is experienced. I know that in the Fourth District the men understand their work very well, and they are willing to correct any error. As to being able to run the stills up to capacity, according to the survey, I beg to differ with my friend, by saying that I know of stills that reach their capacity. I know one that was surveyed last fall, which runs according to survey and without difficulty. We have no trouble in making the capacity of the still or in conforming to the survey up to this time. But in another still in the same building, the survey is defective, and application has been made to have it changed. The two stills are exactly the same, but one was surveyed years ago, and the surveyor did not understand the business in a practical way.

Query by MR. H. A. MERRIAM: Is there any leeway allowed by the Government?

Captain McIntyre: I was about mentioning that 20 per cent is allowed off the working capacity of the still, and that will afford a reasonable margin for error. If that is not enough, however, the only remedy and the best is simply to report the fact and ask for a new survey.

Query: As to the surveys, are they not all based on scientific principles, that the competent internal revenue officer ought to figure out and tell us?

Captain McIntyre: They are; but as you observe by the article I have read, we have to take into consideration that the quantity of brandy that can be produced from a given amount varies very greatly with the material, and makes it very difficult to get at. You may have a "wash" that is rated at twelve gallons to one gallon of brandy. The "wash" may be so strong that it will produce more than one. You may have wine, in other words, that is weaker than wash.

Query: They should show the relative strength?

Captain McIntyre: They mean that the distiller may make the relative strength what he pleases by adding water. He can do that. If your material is to go in first class, it is wine, or if we have added water when we come to distill it we do it as "wash." There is only one of two things to be done, either to raise the strength of it, or to carry it into a lower class, which you are allowed to do. Water won't give us any more spirits. But as we go higher in the scale, the material may be between a higher and a lower one. It may be dropped down to the lower by adding a little water; or you may put in a little material to raise the strength.

Query by Mr. Schell: Can you wash a lees?

Captain McIntyre: You can. Here is a case exactly in point: You may add water to the lees and stir them up and let them settle, which will give you a lower and a better material to begin with. Throw water in and draw it off, and it is wash. If you have added water only, you have brought it to wash.

Remark by Mr. Schell: It is not so defined by the Government; they define what is lees and wash.

Captain McIntyre: They define that, but at the same time they fix the strength or the quantity required for one gallon of brandy, and it is known to the revenue officers, and to all of us, that in practice it is found necessary to wash certain portions, to put in water to reduce its strength or to improve it. Now, if you have lees under consideration, and you want to distill it as lees, that is all right. But if you add water to that it is no longer lees; it is no longer the thick portion of the wine that is drawn off, but by adding water we have got the material of wash.

Remark by Mr. Schell: But it does not come under the definition of wash, but as other material.

Captain McIntyre: The other material provided for in the regulations is known, as I understand it, as singlings. The entire product of the still should be entered up on the distiller's books as singlings. Then when you put back a certain portion in the still to be doubled, it should be entered in the column of "other material," and the product carried out in the "singling column."

Query by Mr. Schell: You will be charged double?

Captain McIntyre: No, there is no difference; it is simply concentrated. But at the end of the month the doubled mass of singlings from the new material put in will be the amount on hand. You have been allowed three tenths of the time to do the doubling. That they allowed

you in the first place; and now they charge back on the survey the amount of time you used, or you charge yourself with it on the book.

I have very little more to say. Here let me say that I am indebted to the Hon. Robert Barnett, Collector of the Fourth District, living at Sacramento, for many points. He favored me with the points on which he found the distillers most in error, in respect to revenue regulations; hence, the following is especially valuable:

MANUFACTURERS OF STILLS.

Section 3244, R. S., imposes a special tax of $50 on manufacturers of stills, and an additional tax of $20 for each still or worm manufactured for distilling purposes. No tax is imposed on a distiller who manufactures a wooden still on his own premises for his own use.

REGISTRY OF STILLS.

Section 3258, R. S., requires every still in the possession of any person to be registered with the Collector of the district, on Form 26, either as being for use or not for use; an omission to so register incurs a penalty of $500.

NOTICE BY DISTILLER.

Section 3259, R. S. Each person having a still so registered and intending to use the same for the distillation of brandy from apples, peaches, or grapes, must, before commencing distillation, give notice on Form 27½ to the Collector of his district, or the deputy in charge of the division, of his intention to distill.

I will respectfully state that owing to the fact that this notice, Form 27½, must be given in duplicate when the distiller executes his bond, the custom in the Fourth Internal Revenue District of California is to simply give written notice to the Collector that the distiller has a still he desires surveyed. It is my opinion that this method is preferable to that of giving notice on Form 27½; that is, when it is a new still that is required to be surveyed.

SURVEY.

On the receipt of the written notice of the distiller, either on Form 27½ or otherwise, the Collector, with the aid of his designated assistant, will proceed to make a survey on Form 99, in triplicate, of the still or stills, unless there be on file in his office a correct survey thereof heretofore made, and it appears to his satisfaction no change has been made in the capacity of such still or stills since last survey. As the capacity of fruit distilleries is determined solely on the capacity for distillation, and owing to the great variety of stills in use and the variable quality and conditions of the fruits used, a distiller who desires to have a correct survey of his distillery should explain to the officer making the survey any peculiar construction or appliance not noticeable.

To better explain this point we will suppose that the officer, after making his measurements, finds the cubic contents of a copper still to be six hundred gallons; there being no charger connected with the still, it is presumed that he will allow one tenth for boiling space, which will leave the working capacity of the still five hundred and forty gallons. His next

step will be, if there is no doubler attached, to allow three tenths for doubling; this will leave the actual working capacity of the still at three hundred and seventy-eight gallons. He will next determine the number of boilings that can be made in twenty-four hours, which will be, as a general rule, six boilings, if steam heat is used, and four if furnace heat. He then determines how many gallons of material it will require to produce one gallon of proof brandy, which will be eight gallons of grape pomace with four gallons of water added; five gallons of sound wine; eight gallons of sour wine; sixteen gallons of wash; sixteen gallons of cheese with eight gallons of water added; and eight gallons of lees or piquette. If, however, a charger is used, the capacity will be arrived at by taking the capacity of the charger instead of the still. In such case the regulations provide that the entire capacity of the charger will be given as the working capacity of the distillery, without making any deduction for boiling space, and that the number of charges that can be distilled in twenty-four hours will be given as the number of boilings.

It often occurs that when the officer who has been designated to make the survey visits the distillery he finds the charger intended to be used either a great deal larger or a great deal smaller than the capacity of the still. When the charger is smaller than the working capacity of the still it will be his duty to make the survey on the still and allow the usual allowance for boiling space. Should the charger be larger than the capacity of the still, and so arranged that the material can be partially heated in said charger, the officer will make his survey on the still and increase the number of boilings, unless the distiller will cut down the charger to its proper capacity.

Should a doubler be attached to the still, the Commissioner of Internal Revenue has ruled that little or no allowance should be made for doubling; however, it is found by close observation that the percentage that should be allowed when a doubler is used varies according to the construction of the apparatus used, and it necessarily follows that the officer making the survey must to a great extent exercise his own judgment in determining the quantity of singlings that must be doubled from each charge. I have also observed that when a still is flat or nearly flat on top, the allowance of one tenth for boiling space is insufficient. Also, that when dry steam is used in heating the material in the still, one tenth allowance is insufficient for ebullition, as is also the fact when the still is charged with cold material. The great variety of stills in use for the distillation of grape brandy, and the variable quality and condition of the grapes from which the material is obtained, render it impracticable to lay down any fixed rules for the guidance of the officer making the survey; it is, therefore, as I have stated before, of great importance to a distiller who desires to obtain a true and correct survey of his distillery, to give the party making the survey all the information possible as to the construction, mode of operation, etc., of his still or stills.

BOND.

After the completion of the survey, and before the commencement of distillation, the distiller must make and execute a bond on Form 30½, with at least two sureties, to be approved by the Collector of the district.

The penal sum of the bond must not be less than the amount of the tax on the spirits that can be distilled at the distillery from the highest surveyed material during a period of fifteen days, as ascertained by the survey.

Although full instructions are printed on the bond of how it should be made out, nevertheless I find as a general rule that it is difficult for distillers to properly fill out said bond. However, if they would but remember that all bonds given in relation to internal revenue matters must have the names of the principal and sureties given in the body of the bond in full, and so signed to the bond, and that a man's initials will not answer the purpose, and that the residence of principal and each surety must be stated in the body of the bond; that the bond must be dated; that each signature to the bond must be made in presence of two witnesses, who must sign their names to the bond as such, and that a small wax or wafer seal must be affixed to the signature of principal and each surety signing the bond, much unnecessary expense and annoyance to the distillers would be avoided. The sureties to the bond must both justify on Form 33, each in a sum equal to the penal sum of the bond, giving a description of their property, so that it can be identified. The affidavits must be sworn to before a Collector, Deputy Collector, or some officer having an official seal, for instance, a Notary Public.

At the time of giving the bond, the distiller must give notice on Form 27½, in duplicate. These notices are easy to fill out, with probably these exceptions:

First—When they state the distance from the distillery to any building authorized to be used for rectifying or refining distilled spirits, they must state that it is "more than six hundred feet in a direct line."

Second—When they state where the brandy distilled will be kept, they must state in a building or room where no wine is made or kept.

Accompanying the bond, Form 30½, and notice, Form 27½, in duplicate, must be the registry of the stills, Form 26, in duplicate, stating whether the still or stills are for use or not for use. If the distiller intends to commence distilling during the month in which he gives the bond, he will state *for use* on and after such and such a date; otherwise, he will state not for use. If the distillery consists of more than one still, and the distiller only intends to use one of the stills, he must state on his Form 26 the still he intends to use, *for use*; the other, *not for use*. In such case he must make application on Form 143 for reduction of capacity, as otherwise he will be charged for the full capacity of his distillery, and will be assessed for a deficiency in the production of spirits, and will possibly have to pay an unjust tax. I earnestly call the attention of all distillers who have two or more stills to this requirement of the regulations. After properly executing the bond, Form 30½, with affidavits of sureties on Form 33, and giving notice on Form 27½, in duplicate, and filling out registry of stills, Form 26, in duplicate, with Form 143 if necessary, these papers should be sent to the Deputy Collector of the division in which the distillery is situated. The distiller must remember that he is not permitted to commence distilling until after he receives notice from the Collector of the district that his bond has been approved. He must also remember that he must make application on Form 143 for reduction of capacity each time he changes the capacity of his distillery.

Sixth—Every distiller must provide himself with a book, Form 25½,

the entries in which, as indicated by the column headings, must be made daily. The entries required need no explanation except that the "hour of commencing" is construed to mean the time when the singlings begin to run; and that under the title of "other materials" singlings should be entered whenever they constitute a portion or all of the charge. The entire product of the still is to be entered as "singlings produced," and that portion which goes back to be doubled being entered as "other material;" the difference between the two amounts will be the amount to be entered on Form 15 as singlings on hand last of month.

BOOK, FORM 25½.

Every distiller from apples, peaches, or grapes exclusively, must provide himself with a book, Form 25½, in which he shall from day to day make or cause to be made true and exact entry of the kind and quantity of material purchased or received; the hours between which the still is operated each day; the kind, quantity, and condition of the fruits used; the number of times each still has been boiled off during each day, and the quantity of singlings and of brandy produced thereby. The distiller must be careful in recording the kind of material used, as the brandy-producing quality of the material thus recorded will to a great extent determine the quantity of brandy that should be produced during the season. I have found by close observation of the monthly returns on Form 15 of the distillers in this district, which are or should be correct statements of their operations taken from their book, Form 25½, that the same material has a more or less brandy-producing capacity during different months. From this showing it would appear that either the distiller has reported the wrong material used or that this material under different conditions will vary in its spirit-yielding capacity. This discrepancy occurs most frequently on the material reported as wash, and is probably owing to the manner of its production or treatment prior to distillation.

REPORTS ON FORM 15.

On or before the tenth day of each month from the time the distiller's bond is approved until the distillery is closed for the season, and the still or stills are registered as not for use on Form 26, the distiller shall make a return in duplicate on Form 15. This return should be an exact copy of the operations of the distillery, as shown by his book, Form 25½, and should be sworn to before a Deputy Collector, or some officer having power to administer oaths, and then forward to the Deputy Collector of the division in which the distillery is situated.

GAUGING.

On or before the twenty-fifth day of each month the distiller shall notify the Collector of his district the probable number of packages of brandy that will be distilled by him within the month, and probable number of wine gallons, with the request to have the same gauged and marked.

If the distiller desires to have the brandy gauged for payment of tax, he will be permitted to keep the brandy, after it is gauged, in the original packages, and at the place of deposit designated in his bond, for four months from the date of gauge, without payment of the tax thereon.

However, he must remember that he must pay the tax on or before the four months expire, and that he must not interfere in any manner whatever with the brandy until the tax has been paid. If the distiller desires to have the brandy produced by him removed in bond from his distillery to a special bonded warehouse situate in the district where his distillery is located, he will notify the Collector of this fact, and when the brandy is gauged, and the gauger hands the distiller his report on Form A2, the distiller will immediately fill out his entry of withdrawal for transportation in bond, Form A3, which is printed on the back of Form A2. He must state on said Form A3 the route, and by what conveyance the brandy is to be conveyed from the distillery to the special bonded warehouse. Forms A2 and A3 must be in duplicate.

The distiller must then execute and deliver to the Collector a bond in duplicate, Form A4, within ten days from the date of the gauger's report, Form A2.

This bond must be accompanied by affidavits of the sureties on Form O33. Full instructions will be found printed on said bond as to how it should be filled out; however, I will again caution distillers, that the Christian names of principal and sureties must be written in the body of the bond in full, and so signed to the bond; that the residence of principal and each surety must be stated in the bond; that a seal of wax or wafer must be attached to each signature; that each signature must be made in the presence of two witnesses, who must sign their names as such; that there must be at least two sureties, and that the bond must be dated. The penal sum of the bond must not be less than the amount of the tax on the brandy. Upon receipt of the Collector's notice of the approval of the bond, Form A4, he will remove the brandy from the distillery to the special bonded warehouse, by the conveyance, and over the route or routes designated in his entry of withdrawal, Form A3, within the time mentioned in his bond, Form A4.

In case the brandy is to be removed from the distillery to the special bonded warehouse, on carts, drays, or wagons, or in case the distiller transports the brandy by his own conveyance, no bills of lading will be required. Otherwise, the distiller will be required to obtain and deliver to the Collector three bills of lading, on Form A5, which must in every case be through bills of lading, and bind each railroad, or other transportation company, and the owner or proprietor of each vessel, or other conveyance transporting said brandy, while in their custody, and being transported by them from the place of shipment to the special bonded warehouse.

The distiller must make arrangements for shipment, rate, and payment of freight, and like details, with the transportation company.

Should the distiller desire to have his brandy removed from his distillery to a special bonded warehouse, located in a district other than that in which his distillery is situated, he will notify the Collector of his district, as in case of intended removal to a warehouse in the same district, except that the distiller's entry (Form A3, indorsed on Form A2) will be executed in triplicate instead of in duplicate. The distiller must then execute and deliver to the Collector a bond in duplicate (Form A6).

The same requirements must be observed in preparing this bond as those required in the preparation of bond, Form A4, except that the penal sum named in the bond must not be less than double the amount

of the tax on the brandy. This bond must also be delivered to the Collector within ten days from the date of the report of the gauger, Form A2, otherwise the Collector will decline to approve the bond, and demand immediate payment of tax. The distiller will also be required to obtain and deliver to the Collector three bills of lading on Form A5, as hereinbefore prescribed.

On arrival of the brandy at the special bonded warehouse, the distiller will, by himself or agent, forthwith report the fact to the Collector of the district in which the warehouse is situated, and will execute in triplicate an entry for deposit on Form A7. The quantity of brandy stated on said Form A7 will be precisely the contents of each cask, as ascertained by the original gauger. The distiller must then execute, and deliver to the Collector of the district where the warehouse is situated, a bond in duplicate, Form A8, with at least two good and sufficient sureties, in a penal sum not less than the amount of the tax on the brandy to be deposited in the warehouse. The instructions heretofore given for the bond, Form A4, must be observed in the preparation of this bond.

Should the distiller desire to remove brandy deposited in one special bonded warehouse to another, situated in the same district, he will execute an entry on Form A3, in duplicate, and a bond on Form A4, also in duplicate, for the withdrawal, transportation, and disposal of the brandy as desired, substituting the words special bonded warehouse for the word distillery, in the entry and bond. The proceedings and requirements, as to bill of lading and other matters relating to such transfer, will be similar to those prescribed in case of removals from a distillery to a warehouse in the same district.

Should the distiller desire to transfer brandy from a warehouse in one district to a warehouse in another district, the distiller will execute an entry for withdrawal, Form A3, in triplicate, and a bond, Form A6, in duplicate, substituting the words special bonded warehouse for the word distillery, when it occurs in said forms. The same requirements as to bill of lading and other matters relating to removals from a distillery to a warehouse in another district must be observed.

The distiller, on arrival of the brandy at the second warehouse, will immediately notify the Collector of the district in which the second warehouse is located, and will forthwith execute in triplicate an entry for deposit, Form A7, and a bond in duplicate, Form A8, as in case of removals from a distillery to a special bonded warehouse in another district.

Brandy made from grapes may be withdrawn once and no more, from one special bonded warehouse for transportation to another special bonded warehouse, and such brandy shall, on its arrival at the second special bonded warehouse, be immediately entered therein, from which warehouse it shall be withdrawn only on payment of the tax or for immediate exportation.

Brandy made from apples or peaches cannot be bonded in a special bonded warehouse.

The proprietor of a special bonded warehouse must look to the depositor for his storage and charges, and should it become necessary to discontinue a special bonded warehouse, the Commissioner of Internal Revenue may require the merchandise therein to be transferred to such other warehouse as he may designate, and within a time to be prescribed

by him, and the expense of transfer must be paid by the owners or depositors of the brandy.

When the owner of grape brandy deposited in a special bonded warehouse desires to withdraw the same on payment of the tax, he must file with the Collector notice and request in duplicate on Form 179. If the notice requests that the brandy be regauged, the Collector will indorse thereon his order to the gauger, directing him to regauge the spirits, and upon the applicant indorsing his entry for withdrawal, Form 179, and paying the tax, the Collector will instruct the storekeeper in charge of the warehouse to deliver the spirits. If there is no request for a regauge the tax on the brandy must be paid on original gauge. Brandy in a special bonded warehouse may be transferred by the distiller to some other party. However, it must be remembered that a distiller having brandy in a bonded warehouse cannot make any sale of the brandy which divests him of the obligation to pay the tax. The distiller who deposits the brandy in the warehouse is the party who must pay tax on and withdraw the brandy, or on whose behalf, the tax paid, withdrawal is made; and as he is the party who must bear this burden, he is the one from whom the tax should be promptly accepted.

The fact is, however, recognized that the distiller can act by an agent, and that naturally the person to whom he transfers the brandy would be such agent. The distiller is the only person who can transfer the brandy from one special bonded warehouse to another.

EXPORTATION IN BOND WITHOUT PAYMENT OF TAX.

When the owner of grape brandy desires to remove the same from a special bonded warehouse for exportation, he will file his notice with the Collector, and Form 206, or A or AA, in triplicate. He will specify on Form 206 the number and serial numbers of the packages he desires regauged for export, and also whether the brandy is to be withdrawn for direct exportation, under Section 3330, R. S., or for transportation for export, under the Act of June 9, 1874. If the brandy is to be withdrawn for direct exportation, after it has been regauged, and Form 206A has been properly executed, the applicant will be required to pay to the Collector the sum of 10 cents for each export stamp affixed to the packages. He will also be required to pay the tax on any deficiency that the gauger's return may show. He will then be required to execute and deliver to the Collector a bond, Form B, in duplicate, with satisfactory sureties, who must justify on Form 33. Upon receipt of the Collector's notice that the bond has been approved, the applicant must immediately procure and deliver to the Collector three bills of lading on Form C. Upon arrival of the brandy at the port of entry, the owner or exporter will forthwith notify the Collector of Customs, in order that the lighterage and drayage of the brandy may be done under his surveillance, and that it may at once be inspected and laden on board the foreign bound vessel.

If the brandy is withdrawn for transportation for export, under the Act of June 9, 1874, the notice and Form 206, above referred to, must be filed with the Collector, but Form 206 will be marked AA, instead of A. The bond will be given on Form BB, and the bills of lading will be marked CC, instead of C, and upon arrival of the brandy at the port of entry, and after it has been duly gauged, inspected, and laden on board

the export vessel, the exporter will be required to execute and deliver to the Collector of Customs, export entry, Form DD, and export bond, Form EE.

Export bonds can be executed and given by parties other than the distiller producing the brandy.

In conclusion, I will call your attention to the fact that a distiller who has given the required bond, and who sells only distilled spirits of his own production at the place of manufacture, or from a special bonded warehouse, in the original packages to which the tax stamps are affixed, will not be required to pay the special tax of a wholesale liquor dealer, on account of such sales.

As distillers' bonds expire on April 30th of each and every year, they should execute and file their bonds during the month of May of each year.

I thank you for the kind attention given to the rough and disconnected remarks that I have made.

Query by MR. J. B. J. PORTAL: You mention that any wine grower or distiller could manufacture his own wooden still. Does that include all, or could he have the copper pipes that are necessary?

CAPTAIN MCINTYRE: He may manufacture a still for his own use, if he chooses. He may make all of it, but if he goes to a manufacturer, the manufacturer must pay the tax.

CHAPTER V.

FOREIGN MARKET FOR BRANDIES.

I am often asked: "To what extent is there a market in Great Britain and Germany for California brandy?"

The most and natural response to this would be, "None at all," were it not proper to qualify it to some extent. As applied to the mass of brandy made in this State no such qualification is necessary. Most of it could find no market in those countries, even for the duties necessary to be paid on their admission for consumption.

The California producer should study the matter a little more closely for himself, and so be enabled to reach safer conclusions than to act on most of the advice he is apt to receive. Such consideration and reflection would show him that in close proximity to those markets are countries whose annual production of wine approximates roughly, say two thousand million gallons, and which it would seem but natural to expect could readily supply all the demand for brandy in that part of the world. He will find that the trade is entirely controlled and monopolized by certain districts in France, and that for many years that country has supplied the world's demand, without a rival.

A few years ago when the ravages of phylloxera in the French vineyards were so serious that prices of brandy became enormously high, and fears were even entertained that the product of the brandy district would be wiped out altogether, the most strenuous efforts were made by the neighboring wine-growing countries to share in this trade by producing at least an acceptable substitute. And yet with all their facilities (which it would seem are much greater than we possess) their efforts were a complete failure. In Italy and on the Rhine the idea was abandoned. Spain still maintains a decreasing trade with England, while Algiers is enabled to continue it, because as a French colony her brandy enters that country without paying the high customs duties. All these efforts coming to naught, France was left as before—mistress of the situation.

The causes are not hard to find; in fact, they lie upon the surface. There is in every natural production of the earth a subtle something, in which it differs from all similar products, which we call character. Most countries have some such specialty, which claims and obtains recognition as the best of its kind. So the brandy of the Charente has achieved this position, and has become the recognized type the world over, and while that from other countries might possess equal, possibly greater merits, still from its lack of similarity it failed to be acceptable as a substitute, and dropped out of the field.

Now, when California becomes ambitious of entering the field, let the brandy maker reflect for a moment on the character of the goods he proposes to do it with, and how made. He sees that other wine-producing countries, using only the most approved material, and commanding

a knowledge of the business, fell far short of success. He knows that his product is frequently but a distillation of spoiled wine or pomace, and only manufactured in order to utilize an otherwise waste product. If, after due reflection, he still hopes for success, he must be a firm believer in miracles, for nothing short of the supernatural could serve to avert the utter failure of the venture.

This applies, of course, only to the class of goods described. With a judicious selection of wine, and the proper care and skill in making, it may be otherwise.

Since the other contestants for this trade have failed—not, as we have been led to believe, because of inferiority of the goods, but because they bore so little similarity to the French cognacs as not to be acceptable as a substitute—it is plain that California's hope, in contesting for the same markets, is that her brandy may approach in character and flavor sufficiently close to the product of the Charente as to find favor as a substitute. Here is required all the skill and painstaking care which the French vineyardists and distillers invariably bestow upon their brandy, or the natural advantages would be neutralized by faults in making.

A limited trade has been started already with England and Germany in the hope that the above requisites have at least in a measure been achieved, and if success is attained, only on the lines as here marked out will it be made permanent.

As to the best age at which brandies should be shipped, I would say that the older the better, if the brandy be really good; otherwise, as young as possible. Age develops faults more prominently than merits when they (the faults) exist.

EDWARD WALDEN, Jr.

CHAPTER VI.

DISTILLATION IN FRANCE.

[In the summer and autumn of 1878, Mr. Charles A. Wetmore, then correspondent for the "Alta California," while in France contributed to that journal a series of thirty-four letters, which, in the words of Mr. Arpad Haraszthy, "aroused new life and hope among our wine growers. * * * Nothing ever written has tended more to benefit our industry than those thirty-four letters."

Mr. Wetmore went to France, at his own expense, as the accredited representative of the State Viticultural Society. After having described the vineyards about Bordeaux, the methods of cultivation, etc., he visited the cognac-producing district. As the representative of the society, he started his investigations in the Charente, with a letter to Mr. Felix Curlier, of the house of Curlier *frères*. The reply formed the introduction to Mr. Wetmore's letters on brandy distillation. It appeared in Mr. Wetmore's letter of November 16th. This, and Mr. Wetmore's subsequent letters, are as follows:]

JARNAC, September 6, 1878.

C. A. WETMORE, *Esq.:*

DEAR SIR, etc.: In response to your amiable letter of August 7th, I take pleasure in giving you some information concerning the products of our vineyards. I hope that it may prove useful to the agriculturists of your country, who are so earnestly interested in the development of this new branch of industry, and in which I wish them the greatest success.

The wine most suitable for producing cognac is the product of different varieties of vines yielding white grapes, commonly known as La Folle, Bouilland, Colombier, Blanc Limousin, Saranson, and St. Pierre. These vines are known to produce the best grapes for this use, and a soil composed of clay and chalk (*argilleux calcaire*) is that which yields wines best suited for distilling cognac.

Warm weather is always necessary to mature the grape in order to make good wine. The best fermentation is that which is attended by an equal temperature; the liquid obtains thus an equal strength. The fermentation should not be made too quickly, and should be finished at least fifteen days before commencing distillation.

Rapid natural fermentation indicates an alcoholic wine; slow fermentation a weak wine—not having as much richness. In distillation of equal quantities the former yields more than the latter, but the two wines may give good products.

The most minute precautions should be taken in distilling. The boiler (*chaudière*) must be cleaned after each charge has been distilled—first, to avoid a taste of brass (*gout d'airain*); secondly, to prevent a burnt taste (*gout de rime*), which may be caused by a very small quantity of wine remaining in the apparatus for only a few minutes.

The first spirits which come from the still are naturally stronger than the last; the average alcoholic strength of good products is from 67 to 68 per cent.

The farmer should always take good care of his casks; when they are new they should be scalded three or four times to prevent a taste of the wood; the merchant must do the same.

Each vineyardist distills his own wine and offers his cognacs to the merchants, who buy the whole or a part, according to their wants. It happens, thus, that the rich farmers keep a certain quantity of their products, in order to sell them eight, ten, twenty, thirty, and even fifty years after their production. It is in this way that good old cognacs are to be found.

The spirit (brandy) ages itself without artificial means, according to the time that it remains in good casks. The imitated cognac, on the contrary, does not improve in any way, and the older it is the worse it becomes.

There is no general rule for blending cognacs, as they are purchased often in very small quantities; the best merchants mix only those of the same year and coming from the same growth (*cru*).

To reduce the strength of cognac and to bring it to the proper degree for consumption, some use distilled water; others, rain water; these two means are equally good.

In France cognac is in no way sweetened; it is delivered to the merchant without any addition of syrup, which tends always to diminish the characteristic flavor or essence of the spirit (*la seve de l'eau de vie*); however, for certain markets, principally the English market, a quantity of sugar, more or less great, is mixed with the cognac. It is to be desired that this system should be abolished; our products would then be delivered in their natural conditions to the public.

Cognac acquires color, little by little, by remaining in good casks; when it is old it may be delivered for consumption without any addition of color. Certain countries like brown cognac (*cognac brun*); it is obtained by adding a certain quantity of caramel.

It is not possible to give to cognac an artificial bouquet which will last. It is this aroma which distinguishes the natural from imitated cognacs and foreign spirits. Unfortunately it is believed that many other means are employed to falsify the genuine products; they are put upon the market to some extent in France, but especially in the colonies, under the denomination of cognac, a fact which does much harm to honest products.

France produces different kinds of spirits, which we will examine hereafter, but the only one which is salutary is that obtained from our wines of the Charente. It is recognized by its natural aroma and its fine flavor.

Let us commence by first telling you what are our different qualities, coming from different growths (*crus*). In general, all the spirits of wine of the Charente bear the name of cognac; they are the best that can be produced in the whole world; they are of the first quality, and are classed as follows:

First—Grandes Champagnes, which cost fifty francs ($10) per hectolitre (26.40 American gallons) more than the Fins Bois.

Second—Petites Champagnes, costing thirty francs ($6) more, etc.

Third—Borderies, costing ten francs ($2) more, etc.

Fourth—Fins Bois, which form the base, and which enter, in great part, into the manufacture of cognacs for French and foreign consumption.

The Grande Champagne may be recognized among all other qualities by a delicate bouquet, and by the very agreeable essence which remains upon the palate very long after tasting.

The Petite Champagne approaches the Grande; the bouquet is less and the essence shorter.

The Borderies have much nerve and tone (*de nerf et de ton*).

The Fins Bois resemble the last considerably, but with a great difference in flavor.

All these qualities are produced under the same temperate climate. It is the soil which makes the difference, according to its nature. There are sometimes the same kinds of land which do not give the same bouquet to the cognac.

Leaving the country which produces the genuine cognac, we have the brandies of the Charente-Inferieure. They are much inferior in quality, and are distilled to a lower degree. They are called Cognac Rochelle. They are always known by an earthy taste (*gout de terroir*) and seaweed flavor (*gout de varech*), very strong and disagreeable. [N. B.—The farmers of the lower Charente manure their vines with seaweed, which is supposed to communicate this taste.—C. A. W.]

The brandies of Armagnac are made at a low degree (about 52 per cent). The flavor is quite peculiar. It is asserted that they are exported to California, especially when they are old. The bouquet is almost nothing; they have no body.

The *trois-six*, or spirits of the south of France, have 90 per cent of alcohol; those distilled from grain are made up to 95 per cent, and their value is one half less than our new cognacs. Spirits of beet roots also contain 95 per cent, and are estimated two thirds less than new cognacs.

There are still some other spirits, such as those of rice, potatoes, etc.

The genuine products being very dear, it happens that much of the varieties of spirits named above is mixed in proportions, more or less great, with genuine cognac, and the mixtures are exported into different parts of the world. They are sold under the name of cognac, very often at prices much less than it is possible to obtain the genuine brandy. The task of distinguishing the genuine product from the mixtures should be left to well-informed merchants.

The characteristic distinctions are that, after a lapse of time, those who drink bad products have headaches—indigestions. All the *trois-six* (common spirits) are corrosive and do much harm. Our pure cognacs of wine are the only ones recognized as hygienic and recommended by physicians and connoisseurs.

It is not possible to estimate the quantity of pure cognac sold, either in France or abroad, under its proper name, much less the quantity of foreign spirits which are mixed with our genuine products.

Alcohol distillers are very numerous in France; other countries of Europe also furnish much. The purchase is secretly made in illegitimate trade. Inasmuch as a great many consumers seek cheap prices, they go by preference to merchants who deal in mixed liquors. The effect of this is such that one may assert that the genuine products are sold now in small quantities, the prices being much greater.

Wines for exportation are generally fortified, all kinds of spirits

being used; but the cognac spirit is always the best, for with it the wine improves in quality with age, while with other spirits it loses in quality. The fortification of wines is practiced more or less, according to their natural strength. While visiting the Midi and Bordeaux you will be able to obtain precise information on this point.

The phylloxera continues its ravages in our vineyards. It is estimated that one half of the vines (in the Charente) are completely destroyed, and if nothing stops the terrible scourge, our rural districts will be completely ruined in a few years. It follows, therefore, that the proprietors of good products do not wish to sell, except at very high prices. The genuine cognac will become more and more rare, and will then be considered an article of luxury.

The Jarnac Fair took place here yesterday. This town is the center for the best cognacs. The current prices were fixed as follows:

Grande Champagne, 1877, per hectolitre	180 francs.
Petite Champagne, 1877, per hectolitre	160 francs.
Borderies Champagne, 1877, per hectolitre	140 francs.
Fin Bois Champagne, 1877, per hectolitre	130 francs.

All estimated at 59 per cent alcohol, without cost of cask, and no discount.

Our vintage will begin from the 25th to the 30th of this month; but according to information now obtained, it is certain that the price cannot fall; on the contrary, the good farmers will only sell very little, and at higher prices.

It may be estimated from the present indications that the crop will be very ordinary in quantity, if not very poor; as to quality we cannot judge the new products until the month of November.

Many proprietors will have a crop this year, but it will be the last; their vines are completely destroyed.

I am having prepared some samples, as you wished me to do. You can without fear show them to your friends, and say that they represent the genuine types of the products of the Charente.

Hoping that the foregoing observations will be of some use, and awaiting the pleasure of seeing you, I offer you, dear sir, my very sincere salutations.

FELIX CURLIER.

JARNAC, September 22, 1878.

Editor "Alta California:"

When I was told here by Madame Curlier and Mr. Pressac, the Jarnac manager for Messrs. Curlier Frères & Co., that Mr. Lewis, their corresponding clerk, would accompany me and assist me in any direction that I wished to go, I thought I would like to begin as nearly at the beginning of cognac production as practicable. I told Mr. Lewis on Friday that I would like to see one of the best vineyards, where the operation of distilling is conducted by an intelligent farmer; and at the same time I suggested that it would also be interesting to me if I could observe the habits of the country people in their every-day life. "All right," he said, "we shall go to-morrow."

I saw that he entered into a private and eager conversation with Carcali, the major domo of the house, but thought nothing of it until the

next day, when I found that he had arranged by telegraph a very pleasant surprise. I supposed that I was going into the country, and would find everything in usual country style; but they gave me a feast that I shall never forget.

At 9 o'clock in the morning, after taking coffee, Carcali was ready with Mr. Jules Curlier's favorite horse, harnessed to a comfortable wagon. Mr. Lewis got in with us, and we started off as happily as could be. The morning was unusually bright and pleasant.

We crossed first the Charente River, on the bank of which Jarnac is situated, and ascended to an undulating plateau, which is known here as the "Grande Champagne." In the center of it, seven miles south of Jarnac, is Segonac, a little town surrounded by the vineyards which produce the finest cognacs. The edges of the plateau are covered with young oaks, in some places growing in very close thickets. Scattered about everywhere were clumps of small oaks. The view extended over miles of country, and was very beautiful—nothing to mar the beauty except the sickly appearance of the vines. I saw leagues of vineyards; but nowhere was I out of sight of the indications of phylloxera. Many vineyards show strength enough for the production of a crop this year; many others promise to yield little or nothing.

The soil was everywhere speckled with broken pieces of a kind of clayey chalk, much of which has been, during past years, added to the soil to increase its fertility; yet there is under the soil a deep and solid stratification of this peculiar mineral. Generally the soil was quite black, crumbling, and almost as light as an ash heap that has been soaked, dried, and plowed up. I have never seen in California, or anywhere else, a soil that resembled it closely. It seems to be a deposit of loam, clay, and chalk debris, covering a vast bed of clayey chalk. The depth of the soil I could only judge from broken places at the roadside, where the farmers were taking out wagon loads of the chalk bed to scatter over the surface of their vineyards. In such places the soil was from ten to eighteen inches deep.

Vines bearing purple grapes are cultivated here; but only for making red wine. These are not used for producing cognacs.

Only the white grapes are useful to the distiller who wishes to produce fine brandies.

At Mons. Cailleteau's vineyard I saw growing the Folle Blanche, Saint Pierre, Colombier (or Colombar), Chalosse, and some others, whose names I did not get—all white grapes. He had also purple grapes for making red wine.

I have tasted most of these white grapes, many of which are now ripe; but they are too acid to be agreeable. I have had bunches of Saint Pierre in my room for several days, but I feel no temptation, even in the mornings, to eat them. Perhaps the climate here has something to do with the apparent immaturity and greenness, for I find the weather much fresher, with cooler nights, than in other places I have visited. In the evenings an overcoat is usually worn, and has been quite indispensable during the time I have remained here.

Further on I will give a more detailed description of these cognac vines.

The notable feature in the fermentation of wines for cognac production is that the grapes are pressed immediately after crushing. The juice, skins, seeds, and all the matter from the crusher go immediately into a

broad, shallow press, and the pressed juice is run off into casks to ferment. In this way all the tannin and flavoring matters of the skins and solid parts are kept from the wine, and the cognac distilled is thus free from all objectionable flavors and essential oils. This method of fermentation accounts for the fact that the white wines here cannot be kept long, being deprived of tannin and other necessary preserving elements. The red wines here appear to keep well.

The wine when made has a simple, acid taste, without any characteristic flavor or bouquet, which may be distinguished by one who is not an expert. It seems scarcely more than the juice of sour apples, slightly fortified with alcohol.

It takes from seven to nine barrels of this white (or pale green) wine to produce a barrel of cognac of from 60 to 66 per cent alcohol.

The distillation is quite a simple process. I will describe what I saw and what was explained to me.

The work is commenced by the farmer, generally within forty days after fermentation, and is concluded before Christmas time.

The distilling apparatus is composed of a pump, to raise the wine to a copper holder, which is between the boiler and the worm, but elevated above them. Into this holder three hectolitres (80 gallons) of wine are pumped; a connecting pipe, with a stopcock, communicates with the copper boiler, and at one side; the boiler holds eighty gallons also, and is filled from the charger above; an escape cock indicates in both cases when the requisite charge is pumped; when the boiler has been filled, the communication is cut off by the stopcock, and the pumping goes on until the escape cock indicates eighty gallons in the elevated copper holder; the fires are lighted in the stone furnace surrounding the copper boiler, which is a cylinder standing in the center, the top coming only to the surface, where it is covered with a copper cap; the cap has a pipe connection to carry off the evaporated spirits; this pipe passes through the elevated copper holder, and heats the wine there, which is destined for the next charge, thus economizing fuel; the continuation of the pipe leads to the worm, which is cooled by water in a simple way, which need not be described.

The heat of the furnace is regulated by a slide in the chimney; wood is better than coal for burning.

The nature of the spirits running from the worm determines the regulation of the heat of the furnace. The farmer has a simple test for ascertaining when the distillation is finished. He fills his sample tube with the liquor as it is running off, agitates it quickly, and tells by the duration and appearance of the globules of air—the "bead"—whether the spirit has all been distilled.

It requires generally about six hours to distill each charge of wine. A coal fire is objected to because it cannot be so easily regulated as the wood, and tends to produce too rapid distillation. The experts can distinguish between spirits distilled by means of coal and wood, the latter always being the best.

The first and last parts of each run are less fine in quality than the middle, and the portions are sometimes kept separate.

As soon as one charge is distilled off, the boiler is emptied by means of a discharge pipe running from the bottom. The boiler is at once cleaned carefully, which can be done by removing the cap and rinsing

the cylinder by means of water and a kind of broom suitable for the purpose.

The cap is then replaced, and the charge, which has been heated in the elevated copper holder, as above described, is turned into the boiler; fresh wine is pumped up above, and the operation described is repeated.

The first run from the worm contains only about 25 per cent of alcohol. It is, therefore, placed in casks, to be redistilled as soon as a sufficient quantity is collected.

The product of the first run must be drawn off for redistillation without disturbing the bottom, which is more or less impregnated with coloring matter and lees. This bottom deposit contains valuable essences, and must be mixed with fresh wine and distilled, the product being equally distributed, according to quantity, by mixture with the entire product of distillation.

The second run proceeds more slowly than the first, consuming about one half more time. The product contains about 65 per cent of alcohol.

After the second run nothing is necessary except filling the casks, which are placed in a convenient storehouse and marked to indicate the year of the vintage, etc.

I have been describing the production of legitimate (*eau de vie*) wine, which I have called generally by the term of "cognac." Properly speaking, it does not become cognac until it has been reduced, blended, sweetened, and colored to suit the trade; but in its natural condition, after a few years, it is much better for consumption than when prepared. New brandies, however, need burnt sugar and sweetening to suit the public taste and the demands of the trade.

In M. Cailleteau's storehouse I had an opportunity to sample brandies in cask, from one year to sixteen years old. The difference of age was thus remarkably apparent. In one year the spirits had acquired a faint coloration. This amber color increased in every sample as the spirit was older. The oldest was a rich amber, and needs consequently no burnt sugar when delivered to the trade.

The bouquet was the next noticeable feature. The older the spirit, the sweeter and more delicate its fragrance. Spirits improve in casks by the elimination of certain volatile principles, and by the production of ethers which result from a decomposition of alcohol. They do not improve in bottles; hence, the brandy becomes oily and softer as it grows older, and its wonderful hygienic and medicinal properties develop. In tasting and using these old brandies, since I have been here, I have experienced none of the exhilarating and exciting effects which I have been used to after drinking the ordinary liquors of commerce. The effects of their use, probably by reason of the ethers contained, are quieting, and promote a disposition to sleep. I have felt every evening while here a good, calm, and honest desire to retire at a reasonable hour, and have slept as quietly as a baby, awaking bright and early. These brandies do not seem to provoke any excitement or desire for a "spree." This is my own experience, and I judge it to be a true one, because I have seen no signs of inebriety or intemperance anywhere here, either among those engaged in this business or among the people of the town. A country town in New England is never more sedate and sober in appearance than Jarnac.

The casks in which these brandies are kept are made of oak, the wood coming principally from Austria, some being produced in France and

some coming from the United States. New casks are scalded several times, and generally first used for holding white wine. After being deprived in this way of bad taste and excess of coloring matter, they are used for keeping fine new brandies. They need to be renewed every two or three years.

It would be useless for me to undertake to describe illegitimate methods of distillation and preparation of brandies. The methods of fraud are too numerous. Some farmers mix *trois-six*, the common spirits of beet roots and potatoes, with their wine before distillation; others mix the base spirits with the genuine brandy; others mix new brandy with the old, so as to cheat in the price. All these frauds are, however, quickly detected by experts.

Large houses, like those of Martell and Hennessey, employ agents to purchase their goods from the farmers. I find it current among the country people that such agents are often bribed to pass inferior spirits in which *trois-six* has been mixed, etc. The farmers say that absolute care in verifying their goods cannot be taken in such houses as those of Martell and Hennessey, though they have fine reputations for the general quality of their cognacs.

The method adopted by Messrs. Curlier Frères & Co. is simple. They engage, for instance, Mons. Cailleteau, a farmer, who is an expert in distilling, and in whom they have great confidence, to keep well informed as to the habits and practices of the country people from whom purchases may be made. If one is ever detected in illegitimate practice, he is never dealt with again. This country agent negotiates purchases among the farmers, and can always command the trade, because only the purest articles are bought, and the highest prices are paid.

But Mr. Jules Curlier himself, at times of purchase, comes and verifies by his own taste the stocks which have been obtained. In this manner they limit themselves to a trade, which does not equal in quantities some other houses, but which, being carefully controlled, insures perfect confidence among consumers, who know their brand—"F. Courvoisier and Curlier Frères & Co."

I have now described the legitimate cognac production up to the time the spirits fall into the hands of merchants. Concerning what happens after that I will write in my next letter.

I will conclude to-day by translating from Count Odart's "Ampelographie Universelle" a description of the varieties of white grapes cultivated in this district for cognac purposes, and with some notes from Dr. Lunier which I have before noticed. Concerning the region of the Charente (cognac district), Count Odart says:

"We pass now to varieties yielding white grapes:

"Folle Blanche (Charente and the seacoast).

"Enrageat (Gironde and several places in Dordogne.)

"It is especially, as the variety producing the best brandies of France, and perhaps of the world, that I place this here; but not as yielding a remarkable wine in any country. This wine is, however, sufficiently agreeable in a good year, but it will keep scarcely six or seven months after the vintage. It is, nevertheless, from this same wine that are produced the famous cognac spirits. The wood of three varieties, which bear the name Folle, has short nodes; the bunches are numerous, berries very close, which makes them more easy to spoil; in form irregular, somewhat cylindrical, swelling at the middle; berries are round, of

medium size, green or yellow, according to variety. The plant is subject, at the time of bursting its buds, to suffer from frost, but when it escapes that the falling of its flowers is not to be feared. Like all the fertile varieties, it requires short pruning.

"The Folle à Grains Jaunes (yellow Folle) is the most esteemed for its quality.

"The Folle Verte d'Oleron, or Gros Plant, in the vineyards of Nantes, for its abundant crop.

"Colombar (Charente). I adopt the orthography of Mons. Boutard, etc. It is to be regretted that it is not very productive, for it passes for yielding the best wine; it is, indeed, with this grape that they make a very good liqueur wine (*vin de liqueur*), very much esteemed in the country under the name of the wine of the Grandes Borderies, near Cognac.

"Chalosse (Gironde, Dordogne, and Charente). This variety is widespread among the vineyards of the above departments. It yields abundantly; is little subject to frost. The quality of the wine is mediocre; but this is a consideration not very important to the producers, for in the country where it is cultivated nearly all the white wines are destined for the distillery.

"Saint Pierre (Charente). It has a vigorous vegetation in every respect.

"The foregoing comprise five sixths (according to Mons. Boutard) of the vines of the Charente—the Folle only comprising the half."

Count Odart describes, also, the Guilin-Musque, Balustre, and Cognac, but they are of less importance.

Dr. Lunier says: "Notwithstanding that spirits obtained by distillation of wine or cider may be delivered for consumption without being subjected to any other manipulation, it is not the same with products containing the same proportion of alcohol—distilled from starchy substances after fermentation—such as beet roots, etc. To remove the bad odors and flavors of the latter several distillations are necessary. These alcohols are known in commerce as alcohols of bad taste (*mauvais gout*), while those are called alcohols of good taste (*bon gout*) which are the products of distillation of wines, cherries, and the juice of sugar cane.

"But these successive distillations, in depriving the common alcohols of the essences which give them their detestable taste, deprive them at the same time of the water with which they were combined. They must afterwards be mixed with water. I will tell further on how much these mixtures of water and alcohol, more or less rectified, differ from veritable brandies.

"The production of these *alcools d'industrie* increased soon so much that that of *eaux-de-vie de vin* lost in proportion its importance. Other circumstances contributed to make this transformation more positive, notably the increase of the consumption of wine in France, and a little later the increase of the exportation of wine, following the treaties of commerce. The vine growers, in fact, principally in our southern departments, found more profit in disposing of their wines in their natural condition than in sending them to the distillery, so that to-day they distill scarcely any wines except those which cannot be preserved, or those which furnish spirits of superior quality, such as those of Armagnac, Provence, and the Charentes.

"To produce good brandies, all wines are not indifferently used; old wines furnish better products than new ones. White wines are generally preferable to red ones, which is accounted for by the fact that white wines, not having been fermented with the skins and stems, contain less of those essential oils which give a bad taste to the spirits.

"As to common brandies, they are especially obtained from wines which have commenced to spoil, or which it is feared will not keep.

"Brandies, especially when they are young, all have the same earthy taste (*gout de terroir*) as the wines from which they come; they do not always lose it, even when they grow old.

"In general, they do not distill alcohols from the marc (the residue after pressing grapes) except in departments where marcs, exhausted by the press, will not serve to make half-wines (*des demi-vins*) and piquettes."

The reader should know that it is a practice in many places to add water and sugar to the marc, and to ferment the mixture, producing, thereby, a weak sort of wine which is often given to the workmen to drink. It is even said that such products, fortified with spirits and flavored, enter into commerce, and are exported as *vins de cargaison.*

C. A. W.

JARNAC, September 23, 1878.

Editor "Alta California:"

To-day I went systematically through the warehouses and working-rooms of Messrs. Curlier Frères & Co., in this place.

The brandies which come in here are necessarily purchased in lots from the farmers who have distilled them. They therefore vary, more or less, in quality and age. Some are laid away to improve by age; others are simply made ready for the French markets, according to order, without any change or modification. A great part, however, must be prepared for foreign markets.

For the foreign markets, excepting in the case of certain lots of old spirits, which have already acquired color and softness by age, the process of producing "cognacs" is here begun. A few buyers take the natural spirits as produced by the farmers, but the demand is generally for the standard cognac.

To produce this article the many small lots are carefully blended, accurate records of the composition and expenses being kept. For this purpose there are great vats communicating with one in an upper story, in the latter of which the blending is operated. From this one the others are filled. The reduction of strength is obtained at the same time by the addition of distilled water, which is produced on the spot from a convenient distillery in the establishment. When distilled water is to be kept for any considerable length of time, it is preserved pure by an addition of spirits. Common water will not serve for this purpose on account of the minerals it holds in solution, which would turn the brandies cloudy by reason of the fact that the alcohol precipitates the lime and mineral salts.

Between the blending vat and the receivers the discharge pipe of the former passes the spirits through woolen filters, to remove all sediment which has been stirred up from the casks in which they have been kept.

The spirits are reduced to a uniform commercial strength of 58 per cent alcohol.

Coloring and sweetening are added according to the order of the trade. In England there is much demand for a very dark brown brandy. Young brandy must be colored to suit all markets. Sweetening follows the same rules. In the case of young brandy intended for immediate consumption, sugar is added to soften the spirits as well as to sweeten it.

Sugar is burnt quite dark, or black, in a copper caldron for the coloring matter.

For sweetening, a syrup is made in another caldron by boiling pure crystallized sugar.

Coloring and sweetening are only added immediately before sending away lots to the trade.

Duplicate samples of all lots prepared and sent away are taken; one is forwarded to the consignee or agent, the other is preserved. The use of the preserved sample is twofold. It is serviceable in filling new orders for the same quality of cognac. By reference to the marks and the books, a complete record of its history, age, blending, coloring, and sweetening is found. Sometimes the consignee complains that the goods do not turn out true to sample. By referring to the preserved sample it can be ascertained whether the trouble has been caused by any mistake of the house here, or whether the liquors have been tampered with in transit. A visit to the room where so many hundred samples are preserved, is one of the most interesting parts of a tour through the establishment. All shades of color, from the faint tinge of amber to the dark coffee brown, are seen.

Cognacs are shipped in casks and in bottles, in all cases the packages being marked with the proper mark of the house. The labels, or "etiquettes," as they are called, are never allowed to be used by any consignee, purchaser, or agent, except as they are originally placed on the packages. The fashion of allowing the purchaser of a cask to use the labels and trademarks of the producing house is what has caused nearly all the petty frauds which disgrace the trade in Bordeaux wines.

A man would buy one cask of genuine wine, for instance, from Chateau Lafitte, and use the trademark upon ten casks of common cheap wine. This practice has been discontinued, as I have been told at Bordeaux, so far as the permission is concerned, but the use of "etiquettes," according to demand and desire of trade, has become a custom. I have myself already bought samples of labels for all the famous Bordeaux wines, and have the prices at which they can be furnished to the trade. This sale is an open one, being no secret whatever.

This Courvoisier brandy, however, I am told, has never suffered from such frauds, unless, perhaps, old bottles and barrels have been refilled and the stamps on the corks forged. The capsule over the corks bears the trademark, having in the center the decoration of the Legion of Honor, granted by the Emperor to M. Courvoisier, the founder of the house.

I saw here to-day about twenty small casks of cognac, just being prepared for shipment to the agents of the firm in San Francisco, Messrs. Hooper & Donaldson. I can congratulate those who are to consume the contents, for they will undoubtedly get pure cognac, though I do not know what is its age and quality.

The inspection of the bottling apparatus and cooper's shops was equally interesting, but cannot be so easily described.

In one store-room, which they call familiarly the "Paradise," there were forty or fifty large tierces of "old" brandy. This is the place for the connoisseur. There were brandies from twenty-five to sixty years old; but of the oldest the quantity is not very great. It is an article extremely *recherché* and valuable.

Probably the best evidence of merit here is in the fact that they furnish spirits, distilled to a high degree, for many of the famous manufacturers of champagne. The finest spirits are required by them to mix with the syrup which they add to thin wines. I have before referred to the necessity of fortifying champagnes intended for exportation.

Here are prepared the spirits for the houses of Jules Mumm & Co., Louis Roederer, Theophile Roederer, Veuve Pommery *et fils*, and George Goulet & Co., Krug & Co., Heidsick & Co., Barnett *et fils*, and others well known in America.

For this purpose, a special distillery is operated, in which the brandies are redistilled up to a degree of 85 per cent alcoholic strength.

The shipping point for this region is at Charente, on the river, near the coast. Jarnac is favorably situated, both for obtaining supplies and for distributing them. The railroad passes along the river to the sea-coast, with easterly and westerly connections with Paris. The river affords competitive means of transportation. The boatmen run a close race in prices with the railroad company.

The connections from Charente with the United States are generally made via England. Hence, only when specially requested, are consignments sent by way of Bordeaux, whence the direct connections are sufficiently frequent. Lines of steamers which take in the entire eastern and western coasts of South America have direct connections with Bordeaux.

Let the reader bear in mind that spirits and wines intended for exportation pay none of the wonderfully complex taxes imposed by the French Government and cities. Hence, prices of brandies and alcohols are quoted in the French markets at the prices in bond. The quoted price indicates the cost to the exporter. I cannot yet enter into a careful description of French taxation of spirits. I am gathering information on the subject, and before leaving the country will write specially upon it. It is complicated by an octroi system, which is a kind of internal customs service for the support of each city. Moreover, Paris is exempt from most of the general laws, and has a special system of its own to study. Import taxes also vary according to special treaties; Spanish wines, for instance, pay more duty than Italian. In connection with my notes concerning the export trade from Marseilles, Cette, and Bordeaux, I shall have to notice these things more particularly.

I made an observation in one of my first letters concerning the comparative difference of the cost of wine in the United States and Paris. I did not then know the taxes imposed by the French Government and the city of Paris. The demonstration now will show that the cost of wine in New York or San Francisco is very little more than in Paris, and my argument in favor of cheaper retail prices for our people was not as strong as I could have made it. Our people should have wine at retail at prices only a trifle dearer than the Parisians pay. The difference of cost is not worthy of notice when wine is sold by the bottle.

I shall never be quiet on this subject until the people, and especially the press, have become keenly alive to the injustice of the extortions practiced by the retail wine and liquor dealers. How an intelligent people can tamely submit to so many frauds as are practiced in the matter of false brands and inferior articles, I cannot comprehend. There is need of some very effective legislation. But of this, more by and by. I should have, in this work, the full sympathy of all honest producers and importers, as well as consumers.

I want to keep telling my readers to look suspiciously upon any present attempts to reduce the tariff on wines and liquors. It means only a movement to facilitate the exportation to us of the very worst products of France. The difference gained by reduced duties at present would all go into the pockets of retailers; the consumer would not be benefited until honesty between the dealer and the consumer is practiced. A reduced duty would simply injure our producers for the benefit of French chemists, dishonest French exporters, and those wicked retail dealers who exercise no care in selecting the articles which they present to their customers, but who purchase only the cheapest stuff in the market. The cheapest French compounds ought not only to be discouraged in the trade, but ought to be made contraband by law. I do not refer to pure cheap wines, but to falsifications and the villainous liquid which is quoted regularly here in trade circulars as *vin de cargaison* (cargo wine).

I am now—having carefully investigated the subject—prepared to assert that a very large proportion of the stuff sent from France to be sold on commission in the United States is on a par only with what the frontiersmen know as "Indian whisky." It is expressly intended for the ignorant foreigner, who has no such protection under the law as the French consumer has at home. How to avoid such stuff will be what I shall try to show in my letters. The wrongs will suggest the remedies. Having learned recently so much about these things is probably the reason why I have experienced so much pleasure in the hospitality and frankness of this house of Messrs. Curlier Frères & Co. There is a freshness of honesty in them that is quite appetizing, and inspiring to the mind. I hope, in the interest of our own people, that I may also inspire an increased disposition to make known worthy merchants.

The cost of cognac wines varies from year to year, according to the abundance of the crops of grapes. The price now is rising, on account of the diminished supply.

The average price for the white wine used for distilling here has varied from 17 to 30 francs per hogshead, containing about two hundred and fifty litres or fifty-five gallons. This would be at the rate of from 7 to 11 cents per gallon. Its price is low, because the wine is not serviceable to the trade for any other purpose except for consumption soon after fermentation. I have tasted some, however, which has been carefully made and bottled, which was not bad, but quite palatable for breakfast use.

C. A. W.

COGNAC, September 26, 1878.

Editor "Alta California:"

Leaving Jarnac and the hospitable mansion where I was so well entertained and provided with every facility for studying the production of genuine cognacs, I came here to complete my work in this district.

Cognac is a city of about sixteen thousand inhabitants, all supported by the trade in spirits, passing current under the name of cognacs. It is about eight miles west of Jarnac, on the same stream—the Charente.

Let the reader remember that, strictly speaking, cognacs, as known to the trade, are not genuine pure brandies. The genuine article is that which is produced by the farmer. When it is of the first quality and old, it is known as Fine Champagne, Grande Champagne, or Grande Fine Champagne. This is much superior in every respect to the so-called cognacs. But not more than 25 per cent of the genuine products of the Charente are of this quality; one half, at least, is composed of the fourth quality, Fins Bois (Bons Bois, Bons Bois Superieurs, Bons Bois Ordinaires, etc.). Then there are, also, besides the second and third qualities (Petites Champagnes and Borderies), numerous brandies of the adjacent country, the Charente-Inferieure (Aigrefeuille, Rochelle, etc.), and of places more remote, which are brought to Cognac for treatment. Hence the percentage of Fine Champagne among all the spirits, legitimately distilled from wine, is small.

The world requires for consumption average articles; therefore, there is a legitimate result obtained in blending these various products. The connoisseur would always prefer pure fine champagne to cognac; but there are few connoisseurs, and therefore the world hears very little about pure brandy. As M. Curlier remarked in his letter which I have already made use of, it would be better for the reputation of brandy if consumers would demand the pure article as it comes from the farmer.

Cognacs should be classified into five classes, viz.:

First—Those in which only pure brandies of one quality or *cru*, such as fine champagne, are blended with distilled water to reduce strength, sweetened with sugar to suit taste, and colored with burnt sugar to suit custom.

Second—Those which contain several pure qualities blended, reduced, sweetened, and colored. This forms the larger part of pure cognacs.

Third—Those which are supposed to belong to the first and second class, but which contain more or less of brandies in which the farmers have mixed cheaper spirits, such as spirits from beet roots, potatoes, etc.

Fourth—Those which are manufactured by a mixture of inferior brandies of cheap price, cheap alcohol, and fine champagne, flavored as well as reduced, sweetened and colored.

Fifth—Those which are pure fabrications, having common cheap alcohol as the base, with foreign matters added to produce flavor and bouquet.

Undoubtedly three fourths of all the brandies known to the world, and passing under the name of cognac, belong to the fourth and fifth classes. From all that I can learn here, I think it is safe to say that much more than one half of all the cognacs, even from this place, belong to these two classes. Remember, also, that Bordeaux, Cette, Marseilles, and Havre export "cognacs;" that quantities are also prepared in all the great cities where the liquor trade is prominent. I do not except New York and Philadelphia. The operation under the first class may be conducted anywhere, though the experts of the business are here, and have the advantage of locality to give credit to their imitations.

I have tried to learn something concerning the extent of the trade in the first and the second class, which may be termed the trade in genu-

ine cognacs. I find it much easier than might be supposed to gather certain outlines. Here the people live entirely upon the commerce in brandy, and reputations of houses are no secrets, except in distant places. I find that the following houses have an unquestioned reputation for dealing only in genuine pure articles: Leonin Arnaud (formerly L. Arnaud & Co.), Augiers Frères & Co., and Jules Caminade & Co., of Cognac; Curlier Frères & Co., of Jarnac. It is also said that Hine & Co., of Jarnac, have the same reputation.

These houses are composed of gentlemen who are wealthy, and take a pride in excluding all questionable articles from their stock. Messrs. Augiers Frères & Co. are said to deal *only* in *old*, as well as genuine brandies; the others deal in old and new, according to the demands of the trade.

The foregoing, however, are not those which do the largest business. A very large business cannot be done in *recherché* goods. I use the word large in its comparative sense, because there are houses here whose business is extraordinary.

The houses doing what is called the first class business are: James Hennessey & Co., Martell & Co., Otard, Dupuy & Co., the *Participation Charentaise, Société Anonyme;* Arbouin, Marett & Co., *Société des Proprietaires Vinicoles de Cognac* (the United Vineyard proprietors), and several of those named above.

There are half a dozen or more named as second class, with reference to the amount of business done, without reference to the quality of the goods. Hence, by naming them, I do not mean to have it inferred from what I write that there are not others whose brandies are quite equal to Martell and Hennessey. Perhaps my information may be in some points defective, and I should give other names as among the first class. In this respect I do not expect to be quoted as authority; I am giving simply the best information that I can obtain.

In the little directory of cognac merchants, which I have before me, I find a large number noticed in the margin as dealers in "stuff," "imitations," "buncombe brands," etc. The marginal notes I have made myself, as the result of inquiry. It would be presumptuous for me to name them, and I should be sorry to make any mistakes.

I should say, respecting the well-known houses of Hennessey & Co., Martell & Co., and some others, that they have an established trade reputation for dealing in only the genuine cognacs of the first two classes named above; but I do not name them among the few who have unquestioned reputation here for dealing only in such goods, for reasons which I shall name. It is granted everywhere here that they do not practice any of the illegitimate operations with *trois-six* alcohol, and that only what is represented as genuine brandies from the farmers (*proprietaires*) come into their magazines; but among the people of the country, all of whom are more or less informed on this subject, an opinion prevails that their agents do not exercise the same care in selecting and purchasing from the farmers, as do the representatives of the houses first mentioned. It is known that the farmers generally, whenever they can profit by it, either add common alcohol (*trois-six*) to their wine before distillation, or to their brandies afterward. It is only with difficulty that this class of frauds can be detected and avoided, and it is asserted that it would be impossible to do as large a business as that of the houses mentioned, and of some others, and at the same time reject all brandies

adulterated with common alcohol. The field for business here is not a large one. It would be a small county in California. The peasants wink shrewdly when they remark that I must see the agents who do the buying for the great houses, if I want to know anything about what comes into magazines at Cognac, and they very significantly suggest that some of these agents make a great deal of money, which cannot be accounted for from their salaries. Excepting, however, this suspected collusion between agents and farmers, whether with or without the knowledge of the firm managers, the cognacs of Martell, Hennessey, and others, have reputations for standard purity.

I have been through the principal warehouses, blending departments, bottling-rooms, cooper shops, etc., of the two great establishments of Hennessey & Co. and Martell & Co. In each case I found an accommodating porter, or *concierge*, whose business it seems to be to show people these great sights.

I expected to see great things, but I was amazed at the reality. I cannot attempt to describe what I saw. The Hennessey establishment is the largest. There was a constant coming in and going out of wagon loads of tierces of brandy; a deluge of spirits seemed to be bottled, barreled, and cased. The *modus operandi* did not appear to differ from what I saw at Jarnac, but in quantity it was almost beyond comprehension. There were several hundred of the great receiving vats connecting with the blending department, each of a capacity of thousands of gallons—acres of casks full of liquid. The extent of the business and its briskness may be imagined when I tell that the quantity of brandy at Hennessey's, bottled, cased, and dispatched to the boats in the river alongside, amounts to from eighteen hundred to two thousand cases per day—*twenty-four thousand bottles*. The number of casks filled and dispatched must also be great, but I did not get the figures. The floors of the great ware-rooms, where the work of filling and branding the cases was going on, were covered solidly and compactly. The briskness of the work was shown by the bustle in the fire-room, where the brands were being heated. I saw them emptying tierces, six at a time, into the blending vats—a small river of brandy constantly in motion.

I felt, when I came out, as though I would strike the first man who ever asked me to drink a glass of brandy again. The sight of so much was positively sickening.

The remarkable thing, after all, was the healthy, cheerful, and sober appearance of all the men and women employed. I did not see one who looked like a drunkard or a toper. They can drink all that they wish, but are discharged at once if found intoxicated. I could see no evil effects of cognacs here; neither have I seen any in the town, though I have wandered about in the evening among the saloons and cafés. It has the air of a very sober town.

I have tried to learn something concerning the imitations of cognac, and I have partially succeeded. I expect, before long, to be provided with more definite information. Meanwhile, I will write briefly on the subject.

In the first place, let me quote a characteristic remark made by one to whom I addressed some questions. He said: "It isn't that I wouldn't oblige you, but if we should tell all about how the business is done here, people could make cognacs anywhere, and France would lose the trade."

Let me first touch upon inferior brandies, such as those of the lower Charente, which have a *gout de terroir* and other bad tastes. There is no way to remove the taste, yet the trade demands that they shall go out as cognacs. They are first mixed with *trois-six* (common alcohol) to reduce the bad taste to a minimum. Then the flavor and bouquet of genuine cognac are produced in several ways. One is to add a portion of genuine old fine champagne, then a little Jamaica rum to give what is called the *rancio*, and the essence of cherry stones to produce the slightly bitter taste. Sometimes the expense of the fine champagne is avoided by using what is called the *seve de cognac*—a product of the druggist, which is sold freely. I find it advertised here, as well as the *seve de medoc*.

In making imitations with only common alcohol as a base, rum and the essence of cherry stones are often used to produce the flavors. The Balm of Tolu is also a "good thing."

I have not yet learned what this "rum" is which they use. It is described to me as a thick liquid, almost black, coming from Jamaica, and called simply "rum." I tasted in a café what they drink here as rum, and found it to be only common spirits, colored like brandy, with a rum flavor. I expect to get a sample of the stuff in Bordeaux.

All these imitations go out to the world as "cognac." They can be made in San Francisco as well as here.

All the leading houses have different grades of cognac, which are well known to the trade, but very little understood by the consumer. Courvoisier brandy (Curlier Frères & Co.), Martell, Hennessey, etc., when bottled, are designated by marks upon the corks, indicating the grade. For instance, there are three principal grades of Hennessey, indicated by one, two, or three stars, the quality progressing with the number. There are also special fine qualities, indicated by other marks. The Courvoisier brandy has seven or more marks, beginning with stars, one, two, three, four, or five, and afterward certain letters. New brandy is not bottled by houses dealing in first class articles—such liquor is sent out in casks. Brandy, it should be remembered, does not improve in glass; hence, new brandy is kept in wood. All brandy improves, the older it gets, in wood; hence, bottling is only done immediately before sending cognacs to the market.

Brandy, therefore, may be said to be of the purest, yet it may not be of the best. Age, purity, and the peculiar excellence of certain vintages are required to complete the qualifications of the best. As the wine varies from year to year, so does, also, the brandy distilled from it.

The area of the Charente is a little less than one million five hundred thousand acres. Large portions of it on the east and northeast are not devoted to viniculture, except in small places.

It is situated in the region of viniculture, which continues northward from the Gironde or Bordeaux district, and may be considered as the northern limit of that region. The climate is freshened by the ocean breezes, and rains are frequent. It is a little cooler than the climate of Bordeaux, and a little warmer than that of Paris. Taking the year 1850 as an example, the lowest temperature was 4 degrees (Centigrade) below freezing point, and the highest 34 degrees above; four days of snow, twelve of frost, six of tempest, twelve of thunder, six of hail, twenty-four of fog, sixty-four of rain, eighty-three of variable weather, and one hundred and fifty-one of fine weather. Rains fall mostly from October to February.

In the northeast there are large forests and broken mountainous regions.

From a work on the brandies, etc., of the Charentes, by M. B. Berauld, of this place, I translate a few passages, viz.:

"*Cru*, called *Grande Champagne*, or *Fine Champagne.*—Champagne (*campus*, or *campagna*, of the Romans) signifies a plain cultivated in vines, or cereals, in distinction from *bois*, or *bocage*, a place planted with trees. The Grande Champagne, between the small stream Ne and the River Charente, comprises only twenty-one communes. The substratum is a whitish, friable chalk. Roots penetrate it easily, and draw from it that essence and mellow (*moelleux*) aroma which have produced so brilliant a fame for the vicinity of Cognac. The variety of vine which produces the best wine for distillation is the *Folle Blanche.*

"*Petite Champagne.*—The Petite Champagne, which embraces a larger region (about fifty-five communes), is characterized by lands less friable and less penetrable. It furnishes, consequently, a less distinguished brandy. The brandy is, however, very delicate, and acquires with age the *rancio*, but in a less degree than Fine Champagne.

"*Borderies.*—Celebrated for white wines from the Colombar vine. It is entirely on the right bank of the Charente; the substratum is of rock, quite hard, with some traces of gravel and chalk. The brandy has nerve and tone. This district comprises very few communes.

"*Fins Bois.*—The circumference of the Fins Bois is quite variable and irregular. The brandy is a little drier, shorter (according to local expression), than that of Borderies. The subsoil is a resisting chalk, and over certain places clay is the predominant element.

"*Bons Bois.*—The geological nature of the soil which forms the area of the Bons Bois is very varied. There are often found, associated in a certain degree, alluvion, clay, gravel, sand, chalk, etc. The number of communes is three hundred and fifty.

"All the other communes of the two Charentes, producing brandy, which do not figure among the above five growths (*crus*), form a sixth class under the name of *Derniers Bois, eaux-de-vie de Surgeres, d'Aunis,* or *de la Rochelle.*"

The relative values of the different growths are given by the same author, as follows:

Supposing *Fine* or *Grande Champagne* to be at 105 francs the hectolitre, we have:

Grande Champagne, first choice	**105 francs.**
Grande Champagne, second choice	**100 francs.**
Petite Champagne, first choice	**90 to 95 francs.**
Petite Champagne, second choice	**85 francs.**
Petite Champagne, third choice	**80 francs.**
Borderies, first choice	**80 to 85 francs.**
Borderies, second choice	**75 to 80 francs.**
Fins Bois, first choice	**75 francs.**
Fins Bois, second choice	**70 francs.**
Fins Bois, third choice	**68 francs.**
Bons Bois, first choice	**65 francs.**
Bons Bois, second choice	**63 francs.**
Bons Bois, third choice	**62 francs.**
Derniers Bois, first choice	**57 francs.**
Derniers Bois, second choice	**55 francs.**
Derniers Bois, third choice	**52 francs.**

From the foregoing statement, remembering that the finest qualities are produced in the least quantity, the commercial advantage in blend-

ing the cheaper with the finer is made apparent. It also shows how variable the price of genuine cognacs may be, when produced by blending, the quality and value varying with the proportions of each kind used.

The quantity of cognacs sent out from the town of Cognac in 1872 was 331,469 hectolitres, or more than 7,000,000 gallons, representing the product of about 50,000,000 gallons of wine, supposing all to have been genuine. This is without estimating the quantities sent from other parts of the Charentes, also that which goes out by way of Bordeaux, which is said to be one third of the whole. I expect to get accurate statistics, when I return to Paris, from the official records.

I gave in the foregoing paragraph statistics from Mr. Berauld's work. I wish yet to know what is the importation of *trois-six* alcohol into this district, in order to compare the respective quantities of brandies actually produced with those sent out, and so determine an approximate estimate of the relative amount of *trois-six* which even Cognac sends to the world under the name of cognac.

Dr. Lunier gives, in his tables of statistics, as the production of alcohol from wine, in 1873:

Charente	59,050 hectolitres.
Charente-Inferieure	60,566 hectolitres.

This was a year of small production. Let me compare figures for 1859, as Berauld does not give statements for 1873.

According to Dr. Lunier, the actual production was:

Charente	120,290 hectolitres.
Charente-Inferieure	75,291 hectolitres.

The quantities produced in other regions within easy reach of Cognac were comparatively very small. Adding the two above, and we have 195,581 hectolitres. Of this only the first part was genuine, fine-flavored brandy. The rest, if all used at Cognac, must have been manipulated for commerce, as I have above described. Berauld gives the quantity of cognacs sent out from the town of Cognac in 1859 as 343,282 hectolitres, to which, I am told, must be added at least one third sent by way of Bordeaux. How to account for such an enormous difference between the expedition of cognacs and the production of brandy is not easy; but it is evident that a large margin must be made for the use of *trois-six*. Berauld gives as the value of cognacs annually sent from Cognac (not counting from Bordeaux) at from 50,000,000 to 70,000,000 francs ($10,000,000 to $14,000,000).

The ravages of phylloxera extend all the way from Jarnac to this place, and indeed all over the country to the south as far as the River Gironde. It is only that portion of the Bordeaux district which is known as the Medoc, where the famous clarets are produced, that is yet free from severe injury.

In my letters from London I treated upon the hygienic uses of wines and spirits. Among the latter, especially for old and feeble persons, fine brandy ranks first. Containing only ethyl alcohol, if old, it also contains many ethers, which produce, no doubt, much of the beneficial effects, promoting sleep, as well as stimulating digestion. It ranks first, among all spirits, as a medicine.

C. A. W.

PART II.

COGNAC DISTILLATION AND MANUFACTURE.

By ANTONIO DAL PIAZ.

Presented to the Commission by the "Pacific Wine and Spirit Review," and translated by William C. Spencer, specially for the Board of State Viticultural Commissioners.

PREFACE.

The consumption of brandy is everywhere constantly extending, so that the question of distillation has an ever increasing importance in wine-producing countries. The need of a treatise discussing exclusively the manufacture of cognac, and of the distillation of wine in general, is now recognized. Aside from various longer or shorter articles which have appeared in the technical papers, there is little literature on the subject. This will be found in the pages which follow. During the last few years numerous brandy distilleries have been erected in Germany, Austria, Hungary, and other wine-producing countries, and progress has been made, especially as the previously existing idea that good cognac could only be produced in France wore away. The conclusion has been arrived at that satisfactory results can be obtained wherever suitable distilling apparatus is to be had and suitable wines used.

For several years I have paid particular attention to the distillation of brandy from pomace and lees; and, from having erected the first brandy distillery in Italy, coupled with years of practice on a large scale, I have had the best opportunities to become thoroughly acquainted with the distiller's art. This has, also, given me ample opportunity to experiment with every device calculated to produce a superior product.

As with brandy distillation, I have also had experience in the production of wine spirits proper, as well as the distillation of pomace and lees. So, also, I have given close attention to the latest and most approved distilling apparatus, and to accessory appliances, so that the highest profits could be attained from the proper manipulation of the raw product.

With some practical experience in the distillery, and with the aid of the directions here given, it will be practicable for every one to obtain not only a good marketable article, but to work with some profit; and, what is of greater importance, to secure a revenue from otherwise unsalable products. It will also enable the distiller to obtain from pricked or poor wines a better price than could be received were the wines sold as such.

Inasmuch as the consumption of brandy is on the increase, the production in countries outside of France assumes great importance, especially as the phylloxera has devastated the sections of France in which the distillation of wine originated. The present is therefore the most favorable time for distillers elsewhere to secure for themselves a most lucrative business which is closely associated with the production of wine, and which can be successfully prosecuted wherever suitable and sufficiently cheap wines are to be had.

This book is possibly one of the first to be published in which practical advice in this matter will be found.

ANTONIO DAL PIAZ.

COGNAC DISTILLATION AND MANUFACTURE.

CHAPTER I.

INTRODUCTION.

It is well known that brandy is obtained by the distillation of wines or pomace, and that its chief component is alcohol. To obtain a proper understanding of all the phases of the distiller's art and operations it is needful to have some knowledge of the changes which are undergone in the various processes.

During the fermentation of any liquid containing sugar, alcohol is formed. This is the intoxicating element of all fermented beverages as well as of brandies and other distilled liquors. Pure alcohol is a colorless fluid of a specific gravity of .7946 at 15 degrees Centigrade (59 degrees Fahrenheit), and boils at 78 degrees Centigrade (173 degrees Fahrenheit; 62 degrees Reaumer), with a barometric pressure of 760 millimetres (normal, 30.4 inches). It will not freeze at any known temperature. It burns with a light blue flame of little illuminating power, smells agreeably spirituous, and has a burning taste.

Alcohol will mix with water in any proportion, with the development of heat and change of volume at the same time. It will mix with different varieties of ether, other alcohols, and fusel oils. It will dissolve resins, ethereal oils, fats, etc., and various fatty acids. It is usually prepared by the distillation of fermented alcoholic liquids.

In the process of distillation these liquids are vaporized by heat, carried off, and the distillates condensed by cooling. In any distillation liquids with a low boiling point necessarily vaporize sooner than those with higher boiling points. This makes it possible to separate from a mixture of two or more different liquids the one having the lowest boiling point. Should the distillate be caught in separate receptacles or portions during the distillation, the process is called "fractional distillation." The first portion is then called the "wort," the following the "middle wort," and the last the "after wort." A second distillation is called "redistillation," or "rectification."

Notwithstanding the fact that the boiling point of alcohol is much lower than that of water, it must not be believed that by heating an alcoholic liquid above the boiling point of alcohol, that alcohol only will be found in the distillate. At the beginning the boiling point of a mixture of alcohol and water is higher than that of alcohol alone, but is lower than that of water. When the boiling point of any such mixture is reached, most of the alcohol will be vaporized; but at the same time considerable water will also be carried off in the form of vapor. The quantity of water thus carried off with the alcohol will increase as the proportion of alcohol in the mixture decreases, and as the temperature is raised. When a temperature of 100 degrees Centigrade (212 degrees Fahrenheit), the boiling point of water, is reached, not a trace of alcohol will remain. When the distillation is begun the

vapors contain the most alcohol, and the proportion of alcohol to water diminishes constantly as the process goes on. The distillate obtained is "raw brandy," or spirit.

The apparatus used for brandy distillation in its simplest form consists of a boiler (or kettle), the helmet (or cap), and the condenser (or worm). By the use of such simple apparatus, however, only a weak distillate can be produced, and repeated distillations are necessary to obtain a product high in alcohol.

All distilling apparatus calculated to obtain a high alcoholic distillate is (no matter of what construction) based on the fact that, as the mixed vapors of water and alcohol go from the still to the condenser, they become richer in alcohol and poorer in water. This increase in the alcoholic degree is secured in two ways: First, by having the vapors strike through a richer alcoholic mixture obtained at the first of the distillation. And, as the temperature is increased as the distillation is going on, a second distillation practically takes place, by which all the vapors produced are richer in alcoholic degree than those coming directly from the boiler. Or, second, the vapors coming from the boiler are allowed to come in contact with a cool metallic surface, and the more volatile vapors only, which are the richest in alcohol, go to the condenser. This contrivance is called the doubler.

Though the principles of distillation were known to the ancients, it was not until the Middle Ages that any practical applications were found, and then with the Arabs. Even before the tenth century Arab doctors are said to have produced alcohol by the distillation of wine; to have used it for medicinal purposes, and, in fact, the very name is of Arab origin. The distillation of wine is first explicitly mentioned in the eleventh century, by the celebrated Arab doctor Abul Kasem, but the process of manufacture was kept secret. The first man who taught the methods of distilling it was Dr. Arnold, of Villeneuve, who lived in Montpellier in the fourteenth century. Even with him, as with the Arabs, it was considered that the brandy distilled from wine was a kind of mineral medicine, and was instrumental in prolonging life. This accounts for the then Latin name of "*aqua vitæ*," and for the French "*eau-de-vie*." Others interpret the words "*aqua vitæ*" as denoting "water of the branches of the vine," exactly as the German *Weinspirit*, or *Branntwein*, indicates that originally alcohol was obtained exclusively from wine.

As early as the fourteenth century a distilled product was brought from Italy, commercially, under the name of "*aqua vitæ*," and at that early day the art of compounding liqueurs and cordials was understood at many of the monasteries.

CHAPTER II.

VITICULTURE IN THE CHARENTE.

After this time the distillation of brandy rapidly extended, particularly in those sections where cheap wines were to be had. In France, which until very recently was the largest wine-producing country, distillation received special attention, particularly in the departments of Charente and Charente-Inferieure. Cognac grew to become the prin-

cipal seat of the manufacture and the commerce pertaining thereto. Consequently, as time went on, all old brandies from the Charentes came to be called "cognac," and subsequently this designation was extended to *all* old brandies, even though not produced in Cognac, or even in the Charentes. The same custom holds good with the various qualities or grades of cognac, such as *Fine Champagne* or *Grande Champagne*, *Petite Champagne*, *Borderies*, *Fins Bois*, *Bois* or *Buon Bois*, and *Bois Ordinaire*, obtained from certain districts in those departments.

The two French departments, Charente and Charente-Inferieure, derive their name from the River Charente, which takes its rise in the mountains of Limousin. Distillation dates back three centuries in the valley of this river, and it attained its greatest importance in the present century.

In grading the brandy, reference is made to the place of the production of the wine distilled. The so-called *champagne* comes from the open country—a district whose general conformation is rolling, and which has a loose, limy soil of little depth overlying a strong white, chalky clay. This soil was originally used for vine culture. Further distinction is made on a soil called Bois, which appears particularly on the plain and on the banks of the River Charente, where forest and pasture land predominated. This is an alluvial soil, containing lime, sand, and clay.

In both departments one variety of grape (the Folle Blanche) is a general favorite. There is also to be found the Colombar (called by many in California the Sauvignon Vert), the Gros Blanc, and the Balzac. The vines are planted in rows of 1½ metres (about 5 feet) distance. In pruning the vines are cut back to two eyes.

The soil is worked twice a year with a vineyard plow—in spring and later in summer while the length of the canes is not too great to interfere with working. From July until the vintage the vineyard is left to itself. The canes interlace, cover the soil almost completely, and the grapes are perfectly shaded. It is on account of this method of cultivation that the grapes ripen slowly, and this result the wine producers in Charente desire to attain. A light thin wine made from grapes grown in this manner yields the best cognac, while a good strong wine made from fully matured grapes will produce a far poorer brandy.

The grapes are pressed as soon as gathered, and the must, without the skins, is left to ferment like any other white wine. As soon as the fermentation is over, and the wine is clear, it is distilled. The majority of the producers distill their own wine, and usually by means of a very simple distilling apparatus. The brandy is repeatedly rectified until it has obtained the desired alcoholic strength, and is then stored in barrels of 500 to 560 litres made of oak and called "tierces" (*tierçon*). It is the usual practice of the producers to hold their brandies some time before selling to the principal merchants of Cognac.

The quality of the brandy varied to a great degree before most of the vineyards were destroyed by the phylloxera.

The finest and most expensive cognac is the *Grande Champagne* or *Fine Champagne*, which is obtained from a wine made from the Folle Blanche, and grown on the Champagne immediately surrounding the city of Cognac. From the less favorable portions of the district included in the Champagne come the *Petite Champagne*.

On the right bank of the Charente, near Cognac, the Colombar is

extensively cultivated, and from it is made the *Borderies*. *Fins Bois* is grown on a limy, alluvial soil, and the poorer qualities, *Bois* or *Buon Bois*, is poorer than any of the foregoing, and is produced on the less esteemed soils of the departments.

When the phylloxera so greatly reduced the wine output of France, and particularly of the Charentes, it was natural that the distillation of brandy dwindled commensurately. But, in consequence, the distillation of wine elsewhere assumed greater importance, especially as the prejudice that cognac could only be produced in France disappeared. The subject received more interest in other countries, in view of the constantly growing demand which met brandies not produced in France. On this account the making of cognac is rapidly extending in such countries as Spain, Germany, Italy, and California, and to the producers of these countries I address myself.

CHAPTER III.

COMPOSITION OF BRANDY.

Pure brandy, being obtained by the distillation of wine, can contain only the chemical compounds contained in wine which are volatile and can be distilled; and provided it has been stored in wood, certain constituent parts of wood which are soluble in diluted alcohol.

The distillate contains, therefore, besides ordinary (or ethyl) alcohol, other alcohols in small quantities, such as amyl, propyl, and butyl alcohols and their aldehydes, certain volatile acids of the fatty acid group, œnanthic ether, and various other ethers which are present in scarcely measurable quantities, but which, nevertheless, form the bouquet of the brandy. Inasmuch as the boiling points of the different volatile constituents vary, and their apparent quantity in each different wine is often widely divergent, it follows that not only are the distillates of different wines unlike, but the separate portions of the distillate of the same wine present different characteristics when fractional distillation is practiced. At the beginning of the distillation the more volatile portions predominate, so that it is perfectly practicable to obtain from one and the same wine brandies having marked differences of character.

It is thus of interest to know the boiling points of the different volatile components of wine used in the distillation of brandy. The boiling points of the principal ones are as follows:

Aldehyde	21° C. (70° F.)
Acetic ether	74° C. (166° F.)
Ethyl (ordinary) alcohol	78° C. (173° F.)
Propyl alcohol	96° C. (205° F.)
Water	100° C. (212° F.)
Butyl alcohol	116° C. (241° F.)
Acetic acid	118° C. (244° F.)
Amyl alcohol (fusel oil)	131° C. (268° F.)
Caproic alcohol	148° C. (298° F.)
Butyric acid	157° C. (315° F.)
Caprylic alcohol	178° C. (352° F.)
Œnanthic ether	225° C. (437° F.)

To the volatile components also belong those which form the bouquet, and which can be recognized in the distillate, especially when distilla-

tion has been carefully conducted and the temperature gradually raised from the beginning to the end.

Raw brandy, as it comes from the still, is perfectly clear and colorless, and will remain so indefinitely if stored in packages which contain no component parts soluble in dilute alcohol—such as glass, etc. If the brandy is kept in wood, however, it absorbs various component parts of the package, which not only affect the taste, but impart to the fluid a dark yellow color, which is one of the most striking characteristics of old (wood) brandy. In adulterations and imitations of brandy it is sought to imitate this color by the use of caramel, or burnt sugar coloring. In most instances the imitators overdo the matter.

Among the materials which brandy will extract from wood are tannic acid, gallic acid, and various other matters. As might be expected, the relative proportions of these will vary in different woods. The taste of these woody extracts will be found missing in all new brandies, or in those which have been stored in glass from the first. Tannic acid (or tannin) is principally responsible for the bitter taste in many brandies, and its absorption should be guarded against as much as possible, especially where the brandy is of particularly fine quality. For this reason it is advisable that the new barrels or packages should be steamed or scalded before being used, or at least soaked in lye and cold water and afterwards rinsed.

Among other extractive matters, that of the yellow oak is to be noticed. It is heavy in water and easily soluble in alcohol. It imparts to liquids lying in oaken casks a peculiarly spicy smell and taste. It is principally this extract which gives that beautiful color to brandy stored in oak packages. The proportions of all the extractive material contained in brandy naturally vary with the time in which the liquor is stored, and the maximum may be placed at 1.5 per cent.

All brandies which are stored from the first in glass naturally contain nothing but alcohol, water, and the other volatile products which are driven over by distillation.

CHAPTER IV.

WINE FOR MAKING BRANDY.

In order to produce a brandy which shall equal the French cognac, the first requisite is a suitable wine. On the quality and adaptability of the wine the quality of the distillate is chiefly dependent. It is, however, in the selection of wines for distillation that mistakes are frequently made. It is a common, though erroneous belief, that every spoiled and otherwise unsuitable wine is "good enough for the manufacture of fine brandy." It is a general rule that wherever the wine is bad or unsuitable, the quality of the distillate will be relatively under the standard.

One of the first properties of a suitable wine is that it should be well fermented and perfectly bright. Young wine can be used to good advantage in the still, and old wine is not objectionable if it has previously been well racked and clarified. If necessary, the wine can be filtered before going to the still. Thus, if a new wine which carries ever so little sediment in suspension is distilled, the brandy may resemble to

a greater or less degree the better grades of brandy distilled from lees, if unskillfully distilled, and it will by no means equal in aroma or flavor the highest type. The same holds true of red wines and of white wines which were allowed to ferment for ever so short a time on the pomace. Spoiled wines, particularly those with a musty smell, milk-sour wines, wines carrying a goodly proportion of acetic acid, or those which have in any manner acquired a musty or disagreeable odor, will not make strictly first class brandy. Should the wine be otherwise sound and clear, a slight percentage of acetic acid—just a pricking—does no harm, and frequently produces a magnificent aromatic product, due to the formation of a minute quantity of acetic ether. It is a mistake, too, to suppose that a heavy, full-bodied wine high in alcohol will give the best results. The brandies will be higher in alcohol if distilled under ordinary conditions, and will be rather rich in œnanthic ether. Consequently, a wine made from grapes slightly underripe rather than overripe will give better results in the still than come from grapes overripe and running high in sugar.

In a few words, the most suitable wine for the production of the finest brandy is a light, clear, white wine, not too old. It should have a fine natural bouquet, which should be imparted to the distillate.

The same wine will frequently, at different stages of development, give characteristically different distillates, and for this reason it is advisable that experimental tests be made from time to time on a wine. The Salleron still will be found useful for this purpose, and before undertaking any distillation whatever, it is perhaps best to make such experimental tests.

CHAPTER V.

DETERMINATION OF ALCOHOL.

The determination of the quantity of alcohol in wine can be obtained by distillation on a small scale, or by means of the ebullioscope, in which the alcoholic degree is determined by the degrees of temperature of the alcoholic vapors escaping on the application of heat. This instrument can be used in practice, and has the advantage of requiring only a very small quantity of liquid in order to be operated successfully. The tests also require but little time.

The Salleron enables the operator to secure a trial distillation and a sample distillate. The small model commonly used in France is shown in Fig. 1. It is composed of the glass vessel *B*, which is placed on a stand over the spirit lamp *A;* the tin vessel *C*, which contains the condenser, or worm. This is connected with the still by the tube *D*, which runs through the perforated cork *E*.

The glass test tube *L* is graduated into two equal parts.

In order to obtain the alcoholic content of a wine, fill the glass test tube with the wine to be tested up to the highest mark *a*. Then empty the wine into the still, and connect the still to the condenser by means of the tube *D*, the vessel having previously been filled with cold water. Then place the test tube *L* under the outlet of the worm. Light the spirit lamp *A*, and let the wine slowly boil. The alcoholic vapors as developed are condensed in the worm and drop into the tube below.

Fig. 1.

The distillation is continued until the distillate comes up to the lower mark on the tube. Water (preferably distilled) is then added to the distillate until the tube is again full up to the top line *a*. The liquid now contains as much alcohol as was in the wine taken for distillation. By means of an alcoholometer, which accompanies the Salleron, the alcoholic degree is obtained. In introducing the alcoholometer, care must be taken to let it sink gently into the liquid, otherwise misleading results may be obtained. It must also be remembered that the alcoholometer is calculated for use at a temperature of 15 degrees Centigrade (59 degrees Fahrenheit), or 12 degrees Reaumer, and the operator should govern himself accordingly. If the liquid is not at the proper temperature, corrections can be made for variations.

If young wines rich in albuminoids are being tested, it is best to add a small quantity of tannin—about as much as would go on the point of a knife—in order to prevent irregular action in the still. If several tests are to be made one after the other, it is best to let the apparatus cool thoroughly before proceeding with a new operation. In using the alcoholometer the operator should be careful to keep the test tube perfectly perpendicular, and to prevent any contact of the alcoholometer with the sides of the tube.

When a somewhat larger quantity of wine than in the still above described is desired to be tested, it is best to have the larger apparatus of Salleron, as shown in Fig. 2. In this the spirit lamp *A* stands in the small tin oven *M*, in which is contained the still *B*. The condenser *C*, with the worm, has an opening at *J* for the introduction of cold water, and the hot water runs out at *H*. The still and worm are connected by means of the tube *D* and the screws *E*. *L* is the glass test tube, *F* the alcoholometer, and *G* the thermometer belonging to the apparatus. The mode of operation is the same as with the small Salleron, with the difference that in the larger one a quantity of wine equal to 400 cubic centimetres (24.3 cubic inches) can be tested.

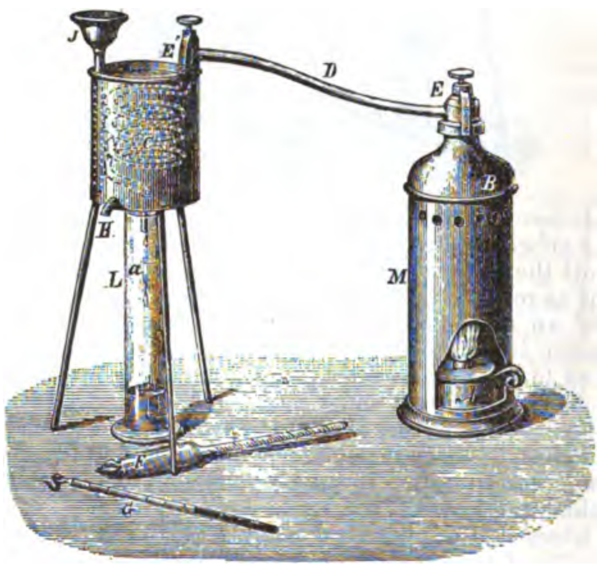
With the ebullioscope the alcoholic determinations are easily and quickly made. This method is based on the fact that an alcoholic liquid has a lower boiling point the greater the content of alcohol.

There are different varieties of ebullioscopes, of which the one of

Malirand is well known. The ebullioscope of Benevolo is well suited for all practical purposes. It is made in different patterns, according as it is to be used all the time in one place or while traveling.

Fig. 3 shows an ebullioscope on an iron stand, such as can be used at home and in a laboratory, and Figs. 4 and 5 show a pocket ebullioscope contained in a tin box made of two parts. On account of its compact form it is very well suited for traveling. The ebullioscope of Benevolo is composed of the boiler *B* in a tin cover, the thermometer *T*,

Fig. 2.



the condenser *R*, the movable indicator *C*, the iron stand *P*, and the spirit lamp *L*. The construction shown in Figs. 4 and 5 is the same. Before using this apparatus, the boiler is filled with clear water, and it is brought to the boiling point by lighting the spirit lamp. As soon as the mercury in the thermometer ceases to rise, the zero mark of the movable rule is brought on a level with the mercury. Inasmuch as the boiling point of water depends on the height of the barometer (or the air pressure), the boiling point of the instrument must be ascertained every day that it is to be used. When this has been done, fill the condenser with water, place the wine to be examined in the boiler, and bring it to the boiling point by means of the spirit lamp. The higher the alcoholic content of the wine the sooner boiling will set in. As the alcoholic vapors condense while passing through the worm, and flow back into the boiler, the boiling point remains constant for a limited time. When the mercury ceases to rise, the indicator on the thermometer must be moved so that it is level with the top of the column of mercury. The other point of the indicator then shows the alcoholic degrees on the side of the sliding scale.

The scale of the rule is in degrees, corresponding with the alcoholic percentage, with subdivisions of one tenth, so that by means of this ebullioscope the alcoholic measurements are obtainable to one tenth of

Fig. 3

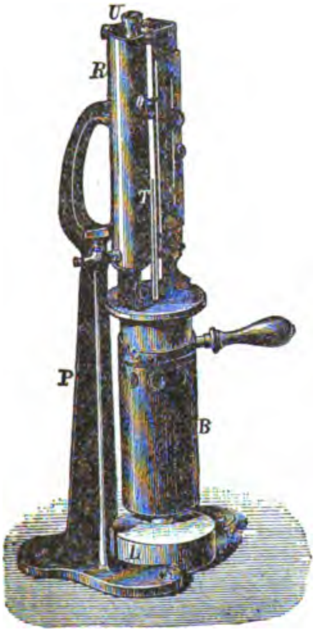


Fig. 4.

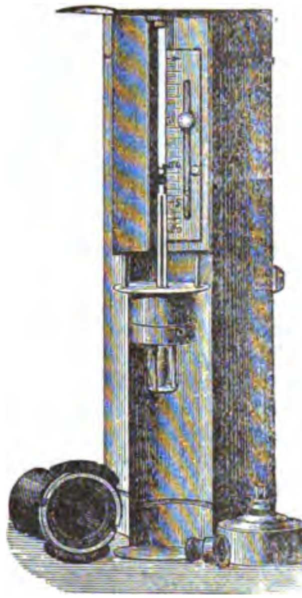


Fig. 5.

1 per cent. If, for instance, the indicator shows 9.5 on the rule, when it is finally adjusted, the wine under examination contains 9.5 per cent of alcohol.

CHAPTER VI.

TRIAL DISTILLATION.

Before distilling any wine into brandy, it is not only necessary to make the tests of the alcoholic strength, as indicated above, and thus calculate the profits, but it is advisable to make a small trial distillation, to ascertain the quality of the product; to know whether the distillate will become a fine article, or will be only an ordinary one, and to ascertain if fractional distillation can be resorted to with advantage. Such a trial distillation can be made in the larger Salleron stills, such as is used in ascertaining the quantity of alcohol in wine (Fig. 2), but it is still better to use, instead, a small apparatus, such as will be used in distilling all the wine, in order that the trial distillation may be, as nearly as possible, under the same conditions as will be met in actual practice. From these tests will be learned the quality of the distillate of any particular wine.

An apparatus admirably suited for such tests is the small still and rectifier of Deroy, the construction of which is on the same system as that of the larger stills of Deroy described later on.

One of these small stills of Deroy is shown in Fig. 6. It is constructed in different sizes, ranging from 1 to 5 litres capacity. The smaller ones

Fig. 6.

are heated with an alcohol lamp, while the larger ones are constructed so as to admit of the burning of coal oil, gas, or even coal.

The apparatus is composed of the copper boiler *1*, which is placed on the stove *11*. On the cover the rectifier *2* is inserted, also made of copper, and covered with linen. *3* is the goose-neck, which connects the still with the worm *4*. The worm is, of course, in the condenser *6*. *5* is the outlet of the worm. By means of the cock *7* and the tube connected therewith water is carried to the rectifier, where by means of the neck ring *8* it is made to distribute itself evenly. The water enters at *9* and goes out at *10*. *12* is the alçohol lamp used for heating.

By the use of this little still a distillate can be obtained running over 50 per cent, and with rectification it can be run up to 90 per cent of alcohol.

The method of use is as follows:

When the boiler *1* is filled with wine the proper connections are made by tubes. The condensing vessel is filled with cold water. The lamp is then lit. When the distillation is about to begin turn the faucet 7 and let the water flow. The water on the rectifier should be allowed to come only in drops, so that the covering will be kept only damp. This assists the process of rectification. To obtain a good and reliable result this must be done, as with a heavier flow all the developed vapors would condense in the rectifier, and the rectifier would fail of its purpose. The heat under the boiler can be regulated at will, and the operation should be conducted slowly. It is also possible during the process to judge of the quality of the separate parts of the distillate, thus enabling a fractional distillation if deemed advisable. When pomace is to be used for distillation it is best that it be covered with water, in order to prevent burning.

The amount of brandy or spirit which can be made from any wine can easily be calculated from the alcoholic contents of each particular wine. It must be remembered, however, that the actual production is always a little lower than the amount which theoretical calculation will show ought to be produced. Unavoidable losses will occur, and the skill of the operator must be taken into consideration. Consequently, when, for example, it is desired to produce 50 per cent brandy, and a hectolitre (26½ American gallons) of 10 per cent wine is distilled, the resultant will not be 20 litres of brandy, but something less—due not only to actual loss of spirit, but to the loss in volume consequent on the mixing of the different alcohols in new proportions. Generally it can be accepted, under the condition above, that the loss in volume will be about one litre (.22 gallon) for every hectolitre of wine; and in

most cases, when due care and attention is given, the loss can be reduced to, say one half of a litre (.11 gallon).

In all calculations of the cost this loss must be considered, as well as the cost of wages, fuel, interest, shrinkage in storage, profit on capital, and other expenses of the distillery. As these factors are not in any wise constant in any particular locality, it is necessary that each distiller figure them out for himself.

CHAPTER VII.

PREPARATIONS FOR DISTILLING.

As has already been mentioned, when speaking of the chemical composition and component parts of cognac and brandy, the distillate is composed of the various volatile parts of the wine; that is, those parts of the wine which can be distilled, whose properties are not only different, but whose boiling points are also different. But the influence which these separate component parts of the wine will exert on the distillate is not the same, and it is possible to regulate the distillation so that those parts which are wanted can be retained, while those which are undesirable can be eliminated.

With the process of distillation well understood and with appropriate distilling apparatus, this can be accomplished, because even with the same wine and same apparatus distillates widely different in character can be obtained by a skilled hand. Though to obtain an excellent product from a good wine the process may be very simple, the distillation of bad or faulty wines requires much more care and attention, and the wort and last distillates may vary very much. When using healthy, sound, and suitable wines it is possible to obtain the first and middle runnings together, and it is only necessary to keep the after wort separate toward the end of the process when the heavy volatile portions are distilled. If only ordinary wines are being used, deficient in flavor and aroma, it is most desirable to rectify the product. For this purpose the product of the first distillation is collected, and this distillate, which contains the heavy fusel oils in large portions, is subjected to another fractional distillation in order to obtain a product of the required strength, and free from the objectionable influences of taste and quality of the distillate. In this second distillation or rectification, the after wort is kept by itself, because it contains those ethers which are disagreeable to the taste, and only the middle run gives the best brandy. The after run, containing the heavy volatile fusel oils, should be again redistilled.

Then a fresh wine is added to the fore and after runnings, and fractional distillation is again resorted to. The quantity of the fore and after runs must necessarily vary with each variety of wine that is put in the still.

Certain light wines, in which the bouquet is not by any means prominent, may yield with one distillation a good aromatic product. This is particularly the case with most of the wines of the Charentes. In such wines as these it is best to obtain at the outset a brandy of the necessary alcoholic strength, inasmuch as by rectification they might lose some of their desirable qualities and bouquet.

In distilling care should be taken that the wine in the boiler is not heated too rapidly, as by so doing the alcoholic vapors would develop too rapidly, and, with insufficient cooling, part of the product might be lost—particularly those light volatile ethers which, in most cases, constitute the fine bouquet of brandy, and which begin to volatilize before the boiling point is reached. Therefore, the heating of the wine, as well as the subsequent rectification, should be done very gradually and the heating evenly done; and besides, especial pains must be observed that the condensing is completed in the worm.

On account of the heavy fusel oils and fatty acids which go over toward the end of the distillation—and which may adhere to the sides of the boiler, or collect in the goose-neck or the worm, rendering the metal liable to attack, and spoiling the wort of the succeeding distillate—it is necessary to clean the still immediately if the distiller desires to produce a good brandy. This cleansing of fatty acids and fusel oils can be accomplished by the use of caustic lye, with the assistance of a brush. In producing the very light grades of cognac fractional distillation is invariably resorted to, and the cleansing is frequently performed. The stills in Figs. 7, 8, 9, 10, 11, 12, 13, 14, 25, and 26 are ordinarily used. It is claimed in France that no matter how well a continuous still is adapted for the production of ordinary to fine brandy, the very best French distillers resort, in most cases, to the old-fashioned stills for their finest product. In continuous stills it is not possible to catch those flavors and bouquets which are most highly prized, and at the same time eliminate the objectionable fusel oils and cleanse the still thoroughly. Nevertheless, continuous stills can be used to great advantage for the first distillation, when rectification is to be practiced, and fractional distillation resorted to on the second distillation.

If, however, acid, spoiled, or only ordinary wines are to be distilled, a fractional distillation will, ordinarily, not be found sufficient to remove all the objectionable features, and some alkali may be used to neutralize the free acid. In distilling such wines, if the vapors or distillates redden litmus paper, the distillates should be caught separately and neutralized with some alkali, such as potash, soda, lime, or chalk, until the fluid no longer reddens the paper, but gives it a deeper purple color. The simplest way of doing this is to take the raw brandy in question and to completely neutralize it. After neutralizing, the rectification can be effected easily enough.

Wines having a moldy smell or a "mousey" flavor are exceedingly objectionable for distillation, and often these disagreeable characteristics will remain after repeated rectifications. Such brandy had best be made into a perfectly neutral grape spirit. Even in this it is difficult to destroy the objectionable flavor and odor.

To effect this, such raw brandy may be treated with permanganate of potash, which, being an oxidizing agent, destroys the bad odor and taste. In this way one can obtain from such brandies a clean spirit without foreign odor, which, however, lacks the characteristic aroma which distinguishes all distillates of wine. To use the permanganate it should be dissolved in water, and the dark solution thus obtained should be added to the raw brandy until it has a dark purple color. In a few hours the purple will change to brown. When the brandy is settled it appears as a perfectly colorless liquid. If necessary, from 3 to 4 kilogrammes (7 to 9 pounds) of coarsely pulverized wood and bone charcoal

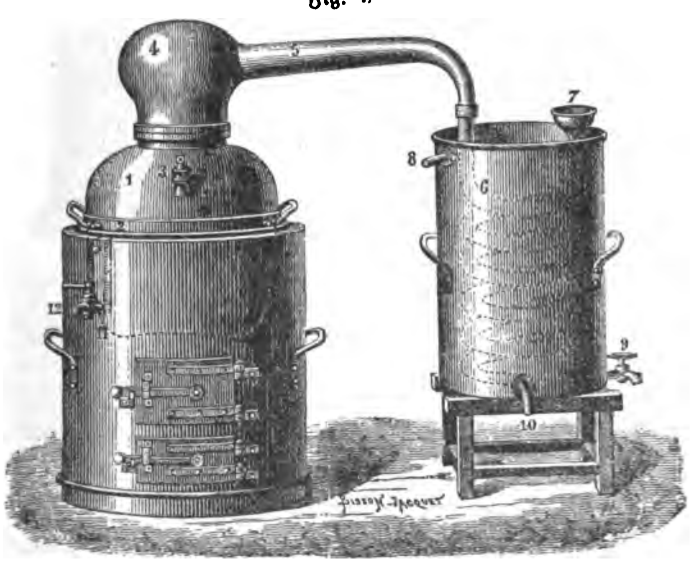
are mixed with every 100 litres (26½ gallons) of the brandy, and when the charcoal has settled well, the brandy, perfectly clear and colorless, is drawn off. If the brandy, deodorized in this way, still contains free acid, the latter must be neutralized with some alkali, in the manner previously explained, before the spirit is rectified. The distilled spirit obtained in this way from spoiled wine is odorless and without any foreign taste. It can therefore be used only to blend with very aromatic distillates, or for the fortification of other wines.

CHAPTER VIII.

SIMPLE STILLS.

When using the simple still the boiler is filled up four fifths with wine or raw brandy, and, as already stated, the distillation is conducted with a slow and constant heat as long as the alcoholometer in the distillate indicates the presence of any alcohol. The strength of the brandy as it comes from the still should not be under 50 degrees (100 proof), and it may run 55 to 60 per cent and over if necessary. It is also to be noted

Fig. 7.

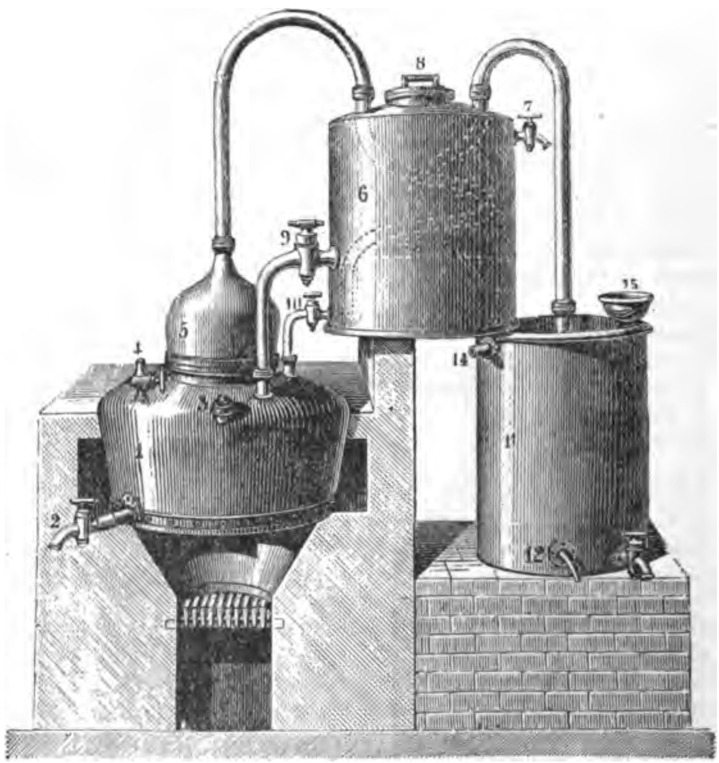


that all brandies, immediately after distillation, have a raw taste, which is dissipated by storage. The simplest of all stills is the kettle still. It consists of a distilling boiler or kettle connected with a worm. In France many of the oldest and most experienced distillers prefer such a still to those which are more complicated or are connected with rectifiers. They permit of fractional distillation, which in some cases is indispensable—an advantage not possessed by the continuous stills. Improvements can, however, be added to these simple stills, which not only facilitate economy in fuel, labor, and an absolute gain in alcohol in the

product, but still preserve all the old advantages favoring the old-fashioned still.

A simple still of such original form is shown in Fig. 7. *1* is the boiler of copper, which is inserted in the iron plate stove *12*. *4* is the helmet, which is connected with the worm by means of the tube *5*. The water enters the cooler by the funnel *7*, which reaches to the bottom of the cooling apparatus, while the heated water in the cooler can be emptied through the faucet *9*. *10* is the aperture from which comes the

Fig. 8.



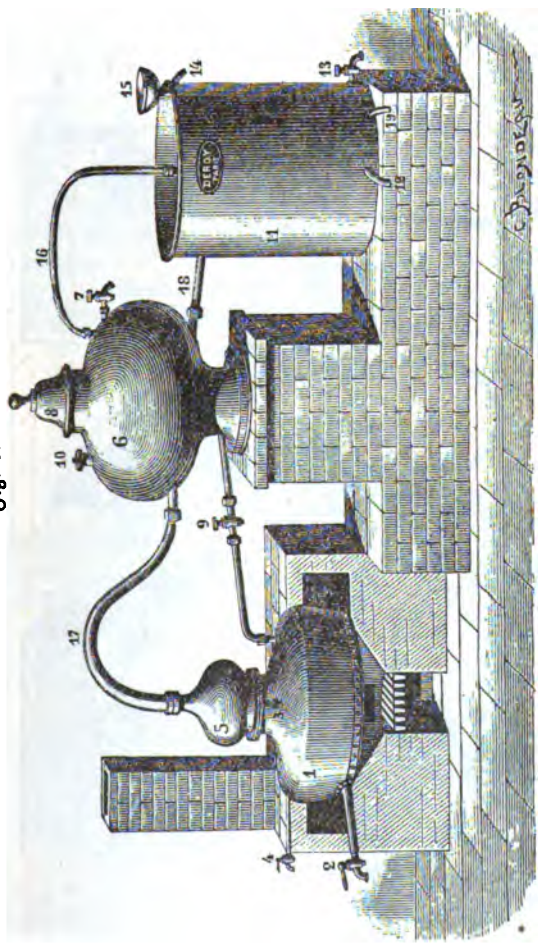
distillate. *11* is the faucet used in emptying the boiler. Through *3* the boiler may be filled.

The simplest apparatus can be improved by adding a heater, and still the operator will be enabled to make any fractional distillations should he desire to do so. Such a heater is shown in Fig. 8. The latter is composed of the boiler *1*, the emptying faucet *2*, and the filling faucet *3*, which is closed by a screw device. *4* is an aerating faucet; *5* is the helmet with the goose-neck. The heater *6* has a double bottom, and is filled and cleaned through the aperture *8*. *7* is the faucet at the opening to heater. The cooling pipe connected with the goose-neck reaches very near the bottom of the heater. *15* is the inlet for the cooling water, and *14* is the outlet for the heated water.

In undertaking a distillation with this apparatus, fill the boiler *1* with

wine exactly to the opening *3*, which is closed with a screw. The heater *6* is also filled with wine until it begins to flow from *7*. The cooler *11* is also filled with cold water. All pipe connections are made tight, and the fire under the boiler is lit. The vapors are partially warmed against the pipe in the heater, and the parts highest in alcohol are condensed in the worm. Afterward the boiler is emptied through the faucet *2*, and is refilled with wine from the heater through the faucet *9*. Then the alcoholic liquid collected between the double bottoms is emptied through the faucet *10* into the boiler filled with wine. The wine, already warmed,

Fig. 9.



which reaches the boiler is mixed with the brandy which has collected in the space between the bottoms, and rapidly reaches the boiling point. Distillation soon sets up. In consequence of this it is possible to make a great saving of time and fuel in this distilling apparatus, and it is likewise possible to obtain at the first distillation a high-proof product.

An apparatus constructed on the same principle, but only in a different form, is the distilling apparatus often seen in the Charentes and shown in Fig. 9.

When using this still the boiler *1* is filled with wine until it begins to run out of the faucet *4*, and also until the heater *6* is filled up to the faucet *7*. The cooler *11* is filled with cold water. Care is taken to close all the connections, and a fire is started under the boiler. The vapors developed in the boiler go through the goose-neck and arrive in the pipe leading to the heater *6*. They heat the wine contained there. From this point the vapors go through the tube *18*, and go through the worm, running out at *12* as a low-grade brandy. The tube *16* carries the vapors developed in the heater through a tube running through cold water, where they condense, to the outlet *19*.

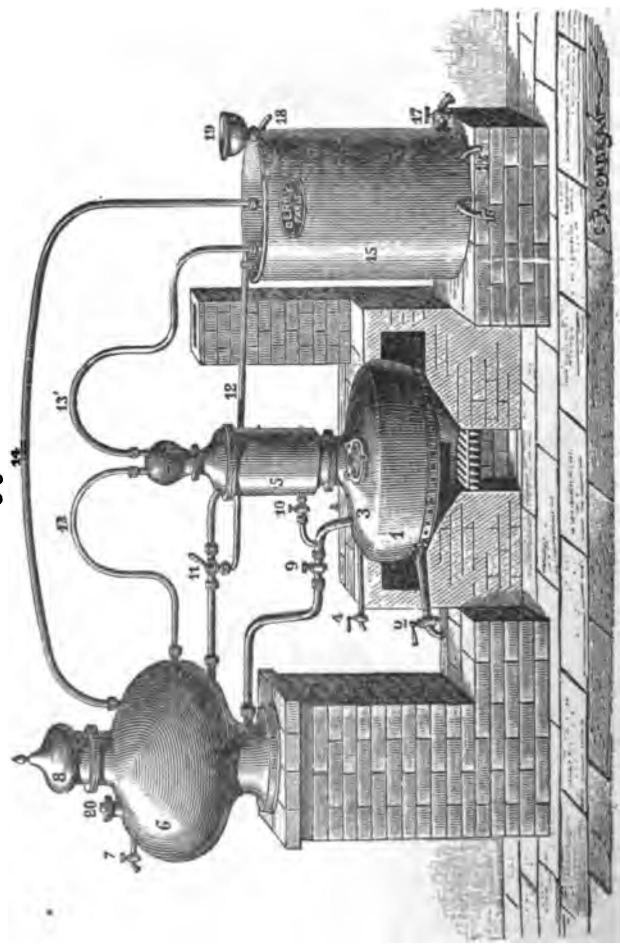


Fig. 10.

When the distillation is finished, the boiler *1* is emptied through the outlet faucet *2*; cleaned, if necessary, and is filled anew with the warm wine from the heater *6* by the faucet *9*. The heater is then filled anew with fresh wine, and distillation can be started up again. When a sufficient quantity of raw brandy has accumulated, it can be rectified in the same apparatus, and fractional distillation resorted to. The

heater is replenished from time to time with water while this is being carried on.

Another distilling apparatus much used in the Charentes, and built somewhat like the foregoing, is shown in Fig. 10. It can produce at one distillation a high-proof brandy, or can give a low-proof brandy, which can subsequently be rectified. If it is desired to make one distillation without rectification, the boiler should be filled as shown in the apparatus (Fig. 9). Then the egress of the vapors should be so regulated by the three-way faucet that after the vapors have passed the goose-neck *13* and the pipe in the heater, they will reach the rectifier *5*, where they condense partially, while the richer vapors escape through the goose-neck *13* to the worm, where they are entirely condensed. They finally emerge through the outlet *16* as high-proof brandy. The tube *14* makes it possible for the vapors developed in the heater to escape.

When the distillation is over, the boiler is emptied through the faucet *2*, and again filled with warm wine through the faucet *9*. The accumulated liquid in the rectifier *5* is allowed to run through the faucet *10* into the boiler. Then the heater is again filled with wine, and in this way the distillation can be continued without interruption.

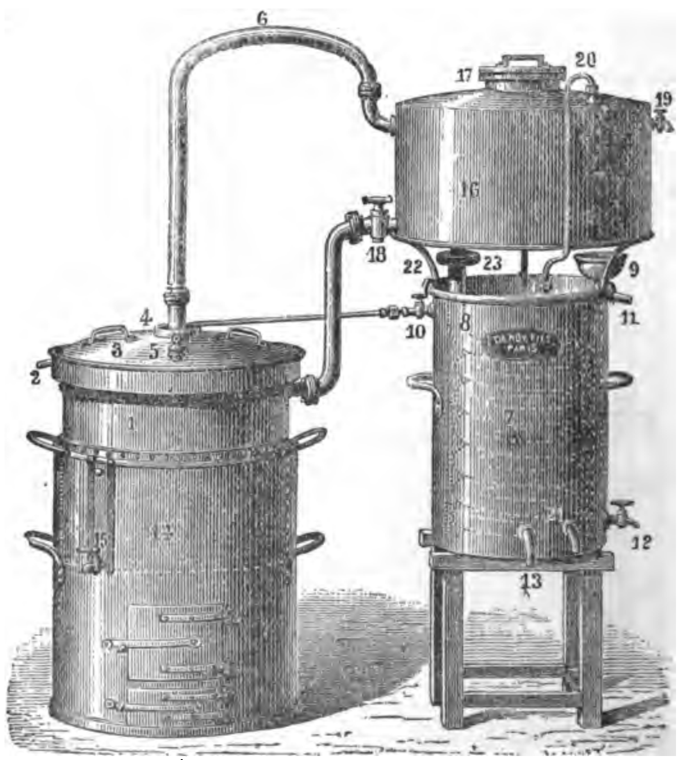
A second distillation can be made by regulating the faucet *11* so that all the vapors pass through the tube in the heater and thence to the worm. The raw brandy thus obtained can be rectified in the same manner as was indicated in the case of Fig. 9.

Fig. 11.

A distilling apparatus, which will be found of special value, is the new boiler in the new patent Deroy system. This can be used for all distilling purposes, and is much more desirable than the old and simple boiler, such as is described in Fig. 7, because it permits of the production of a high-proof distillate from a single distillation, and with a considerable

saving of time and fuel. The boiler of Deroy (Fig. 11), in its simplest and most portable form, is composed of the boiler *1*, which is placed in the iron stove *14*. The upper rim of the boiler, which is arranged for hydraulic closing, has an outlet for the cooling water at *2*. The ring *4* enables the water to be distributed equally over the cover, which acts as a rectifier. The goose-neck *6* conducts the alcoholic vapors to the worm *7*, having its outlet at *13*. *9* is the tube for cold water, which reaches nearly the bottom of the condenser, while the superfluous water has an egress at *11*. *12* is the faucet used to empty the cooler, which stands on the wooden frame *15*. The boiler, inside, is cylindrical, and can be easily handled at will, like any other boiler, when the cover *3* has been removed. The cover is lightly lined with linen, in order to obtain constant and equable cooling from the flowing water.

Fig. 12.



When a distillation is made with this boiler it is filled up to one fifth with the wine. The cover is placed in position and the still is connected with the worm by a goose-neck. The rim of the cover dips into water, making an air and water-tight connection, such as is noticed in gasometers. When the cooler is filled with cold water, and everything is in readiness, the fire is started. The alcoholic vapors are thus developed and can be made to pass immediately under the cover. This in turn can be cooled by a stream of flowing water and part of the vapors

there condensed—especially such components as water and the heavy fusel oils. The alcohol is principally condensed in the worm, emerging at *13*. The colder the cover is kept, the higher will be the proof of the distillate, and it is possible, by regulating this and the flow of water in the condenser about the worm, to regulate in great measure the character of the distillate. With stills with a boiler capacity of 25 to 100 litres (6.5 to 26½ gallons) a distillate can be obtained of from 50 to 60 per cent of alcohol; and of a capacity above 100 litres (26½ gallons), a 70 per cent brandy can be made. If a low-proof brandy is desired, which is to undergo redistillation, it is only necessary to decrease or stop entirely the flow of water through the faucet *10*.

A distilling apparatus constructed on the same system, but with a heater attached, is the new one of the Deroy system (Fig. 12). The arrangement of the boiler and rectifier is the same as in Fig. 11, only the latter has at *15* a faucet for emptying the boiler. The heater is placed above the condenser *8*. *17* is the opening through which to fill the latter. The heater is filled with wine up to the faucet *19*. As the

Fig. 13.

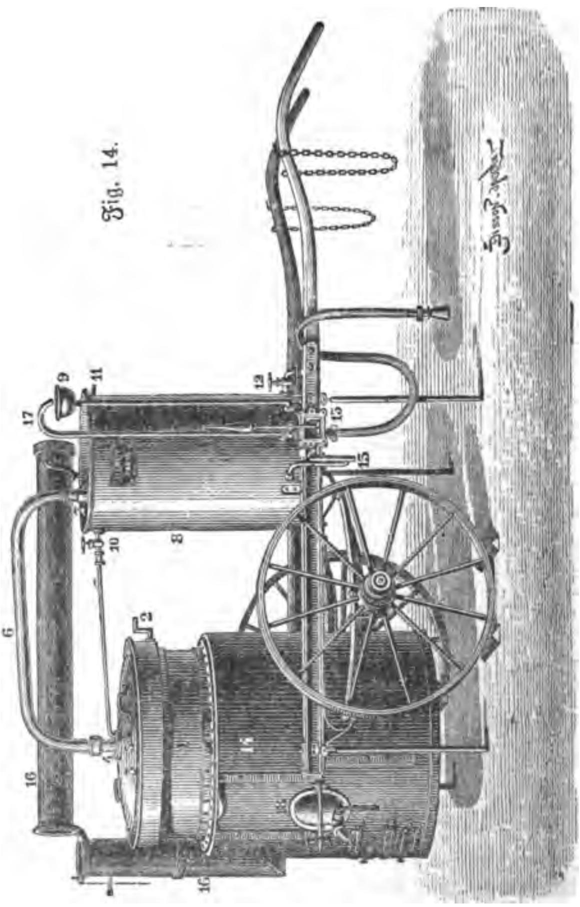
vapors pass from the boiler they are conveyed by a pipe through the heater, and thence to the worm *7*, where they condense and appear as the distillate at *13*. *20* is a tube by which the vapors generated in the heater are carried off and condensed, afterward flowing through the outlet *21*. *22* is the stand for the heater. When it is necessary to refill the boiler it is done through the faucet *18*. Fresh wine is then put in the heater. This enables an almost continuous distillation, with economy of time and fuel, and the distillate can be made of high proof at the very outset. By attaching a so-called rectifying lens or pan to this patented boiler (system Deroy), it is possible to attain from a wine of

small alcoholic content a distillate of high degree (even to 90 per cent of alcohol) with a single distillation.

Such a boiler and rectifier are shown in Fig. 13. Here the rectifier is attached to a simple boiler, as described in Fig. 11.

1 is the boiler; *2* the overflow of the cooling water for the rectifying cover *3*; *4* and *4'* the distributing rings for the cooling water of the cover and the lens; *5* is the opening for filling, having a screw-closing attachment; *6* is the goose-neck; *7* the worm; *8* the condenser; *9* the inlet for cooling water; *10* and *10'* regulating faucets for the cooling water on the cover and lens; *11* is the overflow for the water in the condenser; *12* is the emptying faucet in the same; *13* is the outlet of the worm; *14*

Fig. 14.



is the iron stove; *15* is the stand for the coolers; *16* the rectifying lens, and *17* is the connecting pipe between the goose-neck and the cover of the boiler for cutting out the rectifying lens when a distillate of lower degree is to be obtained. The rectifying lens and the cover of the boiler are thinly covered on the exterior so as to permit an equal distribution over the same. The evaporation on the same gives rise to a cooling on the inside of the lens and cover, and therefore a condensa-

tion and separation of the alcoholic vapors is partially obtained there. The larger parts of the watery vapors and the heavy fusel oils are condensed there, and only the higher grade alcoholic vapors reach the worm to be condensed, and emerge in liquid form at *13* as a high-proof distillate. The proof of the latter depends on the greater or less dampness relative to the cooling of the rectifying lens. By means of this rectifying device it is possible, when desired, to produce a spirit of high proof, or to make a lower proof spirit if wanted.

When lees and pomace are to be distilled with this apparatus, a filtering bottom, which can be adjusted or removed at will, is inserted in the boiler, thus preventing unavoidable burning in distilling over an open fire. When this particular distilling apparatus remains in the same place, the fireplace can be made permanently of brick.

This one (Fig. 14) is shown mounted on a cart to facilitate transportation. It is provided with a suction pump to supply fresh water through the pipe *17*; *16* is the smokestack for the stove; *18* is a lock which can be used for opening when pomace is being distilled. The other distilling apparatus spoken of heretofore can, if necessary, be mounted on carts in the same way. One particular advantage of the distilling apparatus of this system is, that while it is well adapted for brandy distillation, it can be used for all other distilling purposes. It is a very simple matter to operate a still, so that no particularly skilled labor is required.

CHAPTER IX.

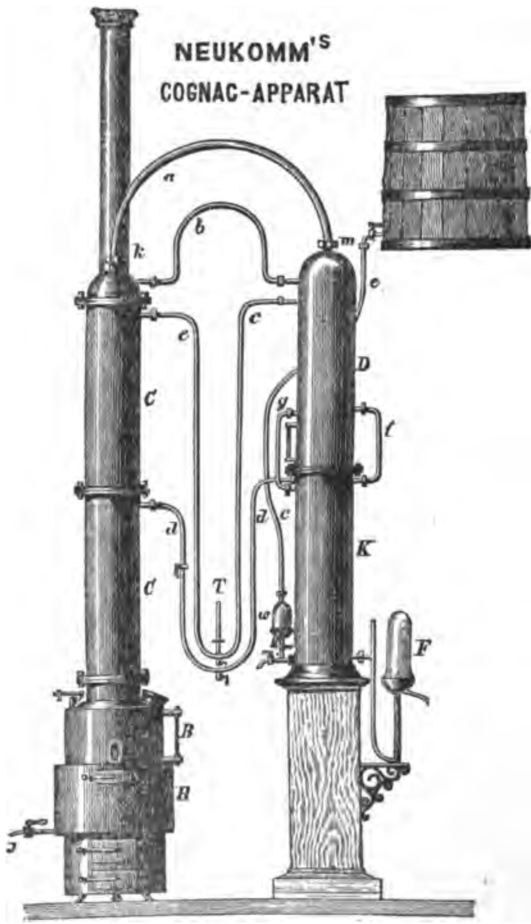
CONTINUOUS STILLS.

Even if, with the previously described simple boilers, a great economy in time and fuel can be effected by the use of a heater, and the process is only interrupted by the time necessary to empty and fill the boiler; yet, in certain cases where fractional distillation is not needed, an apparatus for continuous distilling can be used to distinct advantage.

Continuous stills can not only be used whenever wines will yield with first distillation a fine distillate, but also for the production of raw brandy, which can subsequently be used for fractional distillation. Wherever distillation is to be conducted on a large scale, the continuous stills will be particularly useful.

The Neukomm still is capable of running continuously (Fig. 15). It is an apparatus arranged in the form of a column, and is designed for direct firing. It requires no particular knowledge nor much fuel for operation, and yields a product of excellent quality when proper wine is distilled. The whole apparatus is made of copper, and only the stove *H* and the chimney *k* are of iron plate. The wine to be distilled first goes into the elevated reservoir *R*, but an ordinary wine barrel can be used instead. When the faucets are opened the wine flows through the rubber tube *e* into *K*, and from there through the pipe *f* into *D*; thence through the pipe *cc* into the vaporizing column *CC*, where it passes single rectifying plates and falls slowly into the boiler *B*, where the last remains of alcohol are extracted. The boiler is in the stove *H*. When it is desired to put the still in operation, the wine is allowed to flow in until the boiler *B* is filled, until it is visible in the glass tube;

Fig. 15



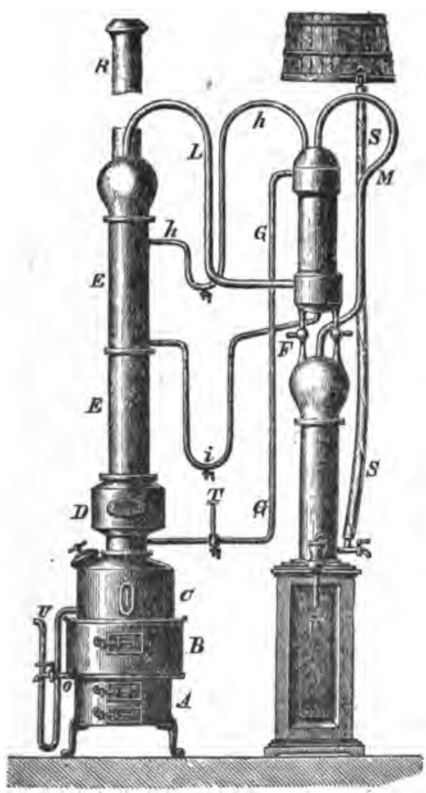
then the regulating faucet is closed and the heating can begin. Very soon distillation starts up, and the developed vapors rise through the column *CC* and the spirit tube in *D*, where a partial condensation takes place. The richer alcoholic vapors arrive through the pipe *g* in the cooler *K*, condense there, and run out at *F*, where the alcoholometer is placed. They then have a strength of from 55 to 75 per cent.

As soon as the distillate begins to collect, it is turned back into the column *CC*. When the alcoholometer at *F* indicates more than 50 per cent, the wine in the boiler *B* has been sufficiently distilled, and the continuous operation begins by opening the outlet faucet *j* of the boiler, and the regulating faucet *m* at such a rate that the fresh wine constantly replaces that which is distilled. The wine that flows slowly over the plates is almost entirely vaporized by the steam which rises from the boiler. Eventually a residue reaches the boiler, where the last traces of alcohol are driven off. The temperature of the wine which flows

through the pipe *C* must always be under the boiling point. With a continuous operation, care must be taken that a product of the desired strength is obtained from the first; that is to say, a brandy of 55 to 60 per cent. This can be accomplished to a certainty by proper regulation of the faucets *j* and *m*, and by keeping the firing constant. The higher the alcoholic degree desired, the lower must be the temperature of the wine as it goes to the still.

Another good continuous still is that of Stollar (Fig. 16). This apparatus is designed by Professor Stollar, and is similarly arranged to the one mentioned above. In this one the boiler *C* is provided with a window, and inserted in the stove *AB*.

Fig. 16



A manhole which can be kept securely locked makes the cleaning of the boiler possible when necessary.

O is the emptying faucet for the boiler; *D* is designed to use up the raw material entirely; *EE* is the evaporating column; *L* and *M* the pipe conducting the spirit from the still. The pipe *F* is provided with three faucets. Through the rubber tube *S* the wine is led from the elevated reservoir, thence through *GG* (provided with the thermometer *T* at the emptying faucet) into the column of the still. *hh* is an alcohol pipe

Fig. 17.

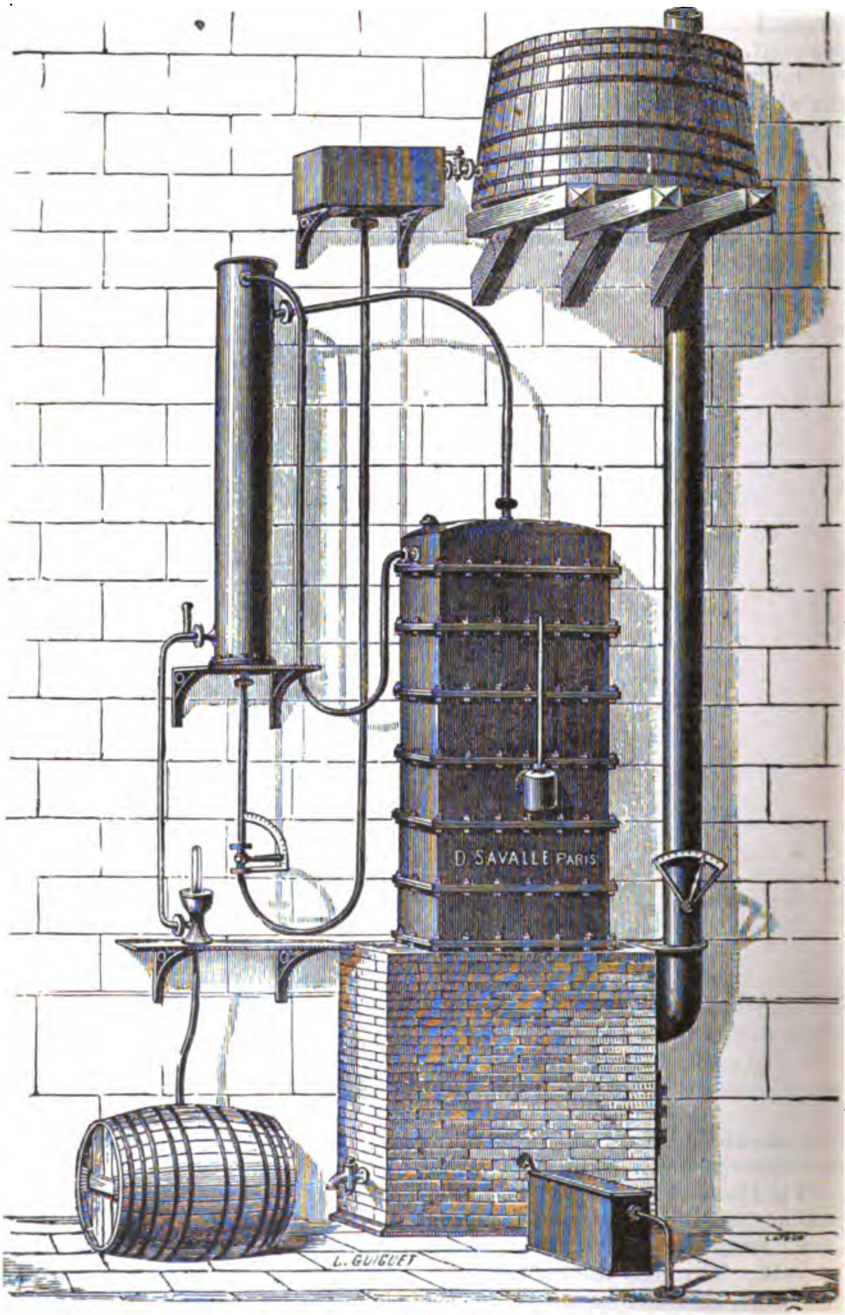


Fig. 18.

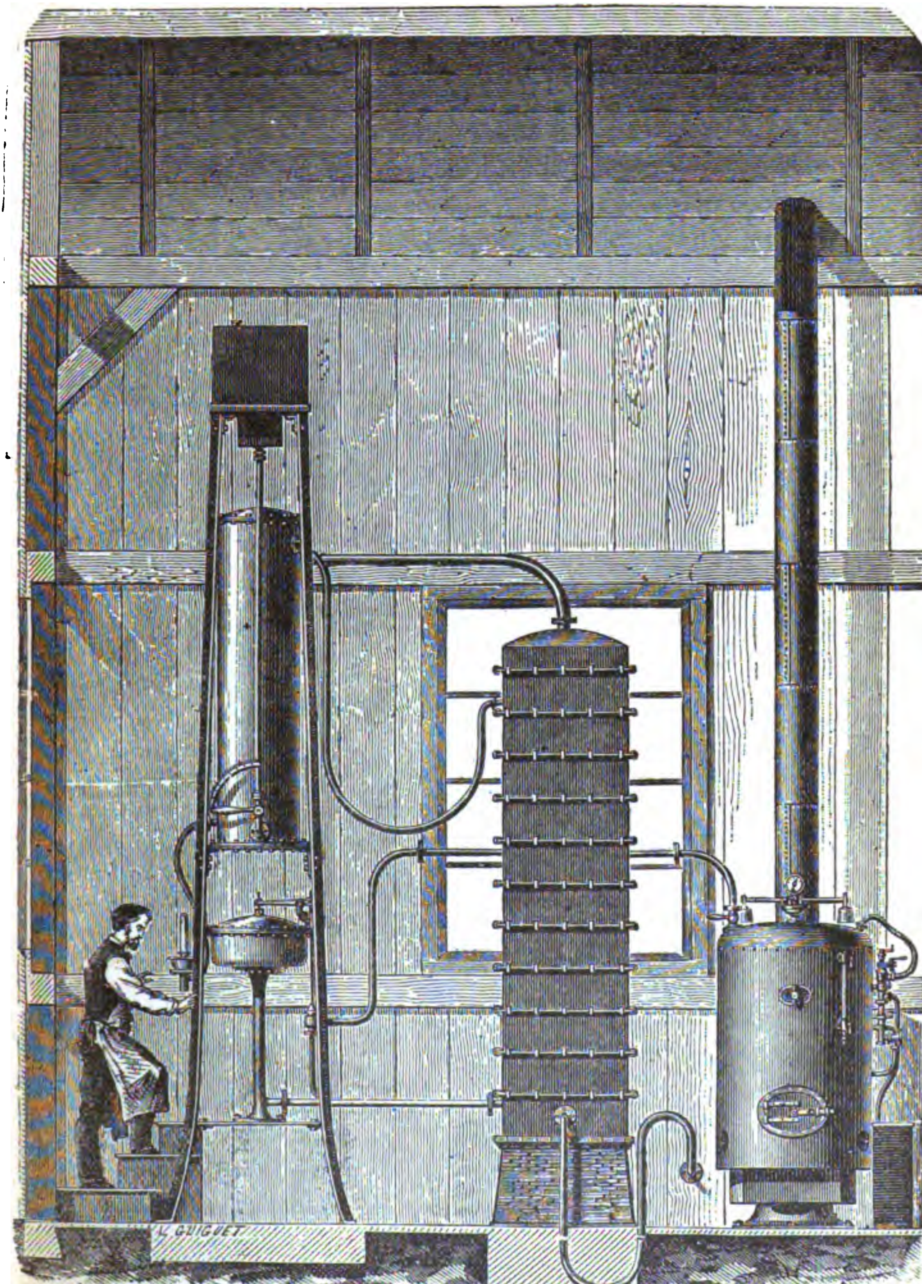
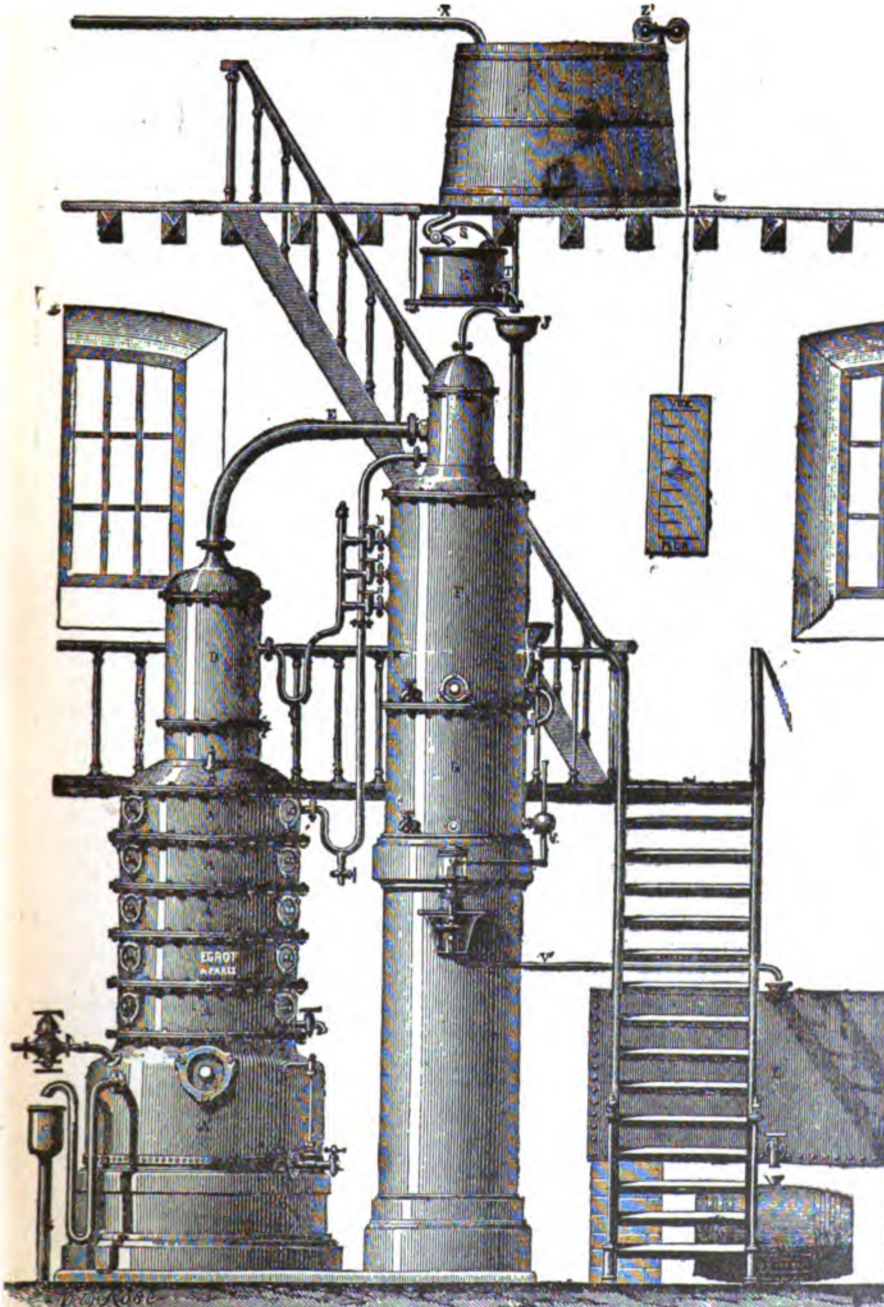


Fig. 19.



supplied with an emptying faucet; *V* is the outlet for the distillate; *U* is a siphon for regulating the height of the boiler filling; *R* is the smoke-stack.

To put the apparatus in operation, the boiler is first filled with water to the height of the tube *U*, and the fire is started. If the apparatus has not been used for some time, let the steam which is developed in the boiler flow liberally through all parts of the apparatus, to get rid of the musty air, and to clean the pipes thoroughly. In doing this, open the pipes *h*, *i*, and *G*, and, if necessary, repeat. Care should be taken that all connections are snug and tight. As soon as all is in order, and the outflowing vapors are odorless, the faucet to the reservoir is opened, and the faucets on *i* and *h* are closed. This allows the wine to be warmed before it reaches the distilling column. The water in the worm is permitted to flow out. This cleans this part of the apparatus. The wine rises through the pipe *F*, and thence through the pipe *GG* into the column. When it appears at the outlet faucet under the thermometer, the faucet is closed, and distillation can begin. Care must be observed to have steady firing; also, that the wine flowing into the column has as constant a temperature as possible. The wine passing through the column is almost entirely distilled, the last traces of alcohol being removed in the boiler.

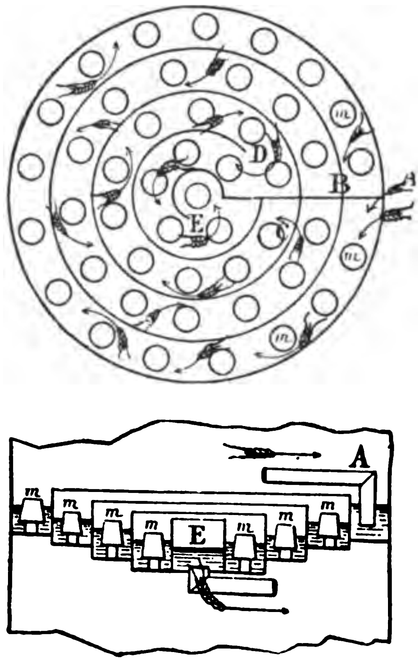
Another continuous still for direct firing is the portable apparatus of Savalle (Fig. 17). It is mounted on a brick stove, but can be so modified as to be mounted on a wagon. The smallest of these stills yields in ten hours 600 litres (132 gallons) of brandy of 60 per cent alcoholic strength. It works on the same principle as the others. The larger still of Savalle is shown in Fig. 18. It consists of a small prismatic column, a cylindrical condenser, and a heater, above which is placed the reservoir for the wine to be distilled. Like all of Savalle's stills, it works automatically when once adjusted, because the flow of wine, etc., is self-regulating. Therefore, the distillation can be conducted by any ordinary workman, once the still is started. All he has to do is to keep up the fire under the boiler and see that the wine reservoir does not become empty. This apparatus will produce, according to size, 600 to 14,000 litres (132 to 3,080 gallons) of brandy of 60 per cent alcoholic strength per day.

A superior continuous still, and one constructed differently, is that made under the Egrot system. Such a one is shown in Fig. 19. The wine in the reservoir *Z* flows into *R*, the flow being regulated by the faucet *S*; from *R* the wine passes through the funnel *J* and goes into the heater. Through the pipe *K* the already heated wine passes to the distillation plates in the column *AA*, where, by means of a number of boiling plates, it is deprived of all of its alcohol, and leaving the last plate falls into the boiler *A'*. Thence it goes through the siphon into the outlet funnel *C*. Fig. 20 shows the plan and section of the plates. The arrows indicate the direction that the wine flows. The wine enters at *A*, and reaches the lower partitions *B*, *C*, *D* of the plate, in which are situated the boiling pipes *m*, which are heated from below by the vapors of the lower plates and from the boiler. The wine, on finally reaching *E*, flows to the plate next under.

The alcoholic vapors which form on the plates *A* (Fig. 19) rise into the rectifier *D* and pass through the goose-neck *E* into the worm contained in the heater *F* and the condenser *G*, where they condense. The

distillate on leaving the still flows through the pipe *V′* into the reservoir *Y*, after it has passed the test tube with the alcoholometer at *V*. According to whether the distillate is wanted of high or low alcoholic degree, the faucets *N* are opened or closed.

Fig. 20



A movable still of the same sort is also constructed. Such a still is shown in Fig. 21. The wheels are very large, so that the still can pass over even the worst roads. The iron furnace *b* is double, and has a small chimney. The reservoir *Z* is over the apparatus, and is filled by means of the pump *X* attached to the iron cart. The operation and installation are the same as described in the stationary still under Fig. 19. The wine to be distilled is used for cooling in the condenser. The wheels and the cart are of iron. The shafts can be shortened or lengthened at will. All of these stills are made of different sizes, and the smaller ones (Fig. 19) can be arranged for direct firing.

CHAPTER X.

TREATMENT OF NEW BRANDY.

The distillate is not only perfectly colorless on coming from the still, but it is also more or less raw and burning to the taste. Only by long storage does it acquire that peculiar softness which distinguishes old cognac. It also acquires certain peculiarities from the absorption of

extractive substances which come from the wood of the barrels, and the color—too often imitated with burnt sugar, but only for the unknowing—should come from the same source. While stored in barrels certain bouquets are developed, principally owing to the action of the atmosphere which passes in through the pores of the wood. Little by little that fine cognac bouquet is developed, which, in time, will increase the quality, even of inferior goods. Brandy which is put in glass packages immediately after distillation, and is kept thus, remains entirely colorless, and develops its bouquet much slower than if stored in wood. The storage in wood has the additional disadvantage of causing a considerable loss by evaporation, and the alcoholic content is also reduced.

It is known from experience that on the average 500 litres of distillate containing 70 per cent of alcohol will be reduced to 350 litres of 50 per cent in twenty-five years. In order to avoid too excessive a loss, the heaviest possible wood—particularly the close-grained oak wood—should be used. This oak has a more favorable influence on the quality of the brandy so stored, than if the liquor is in lighter oak, or other wood richer in tannin.

It is not advisable to leave brandy long in new barrels, whenever it can be avoided. It absorbs too much of the extractive material from the wood. Wherever the laws will permit, the brandy should remain only a limited time in new cooperage, and be then drawn off into barrels and casks which have previously been used. Whenever long storage is contemplated, the least possible evaporation is naturally desired. This is best attained by storing in a medium dry cellar, which is kept at a moderate temperature.

Dr. J. Bersch has proposed a method by which excessive evaporation can be avoided. He advises that the outside of the barrels be covered with a lacquer—an amber or copal lacquer—whereby the evaporation is prevented to a large degree. This, however, interferes with the free passage of the air through the pores of the wood. To obviate this defect the barrels may be filled up only nine tenths full, and the air in the empty space above renewed every four or five weeks by means of bellows.

When brandy is stored in new barrels, and in a warm temperature, it will acquire more rapidly the characteristics of older goods, but at the expense of the quality, if allowed to mature under normal conditions. Such forced aging is to be recommended only for inferior and cheap grades. Fine brandy can only attain its greatest perfection by long storage, and it is by checking the heavy evaporation, as above described, that the heavy losses incident thereto by evaporation can be avoided. Wherever the laws will permit, the barrels should be kept full, unless some such expedient as mentioned is adopted.

Very fine brandies, which show a well-developed bouquet of certain fine wines from which they were produced, are often bottled immediately after distillation, in order to preserve this bouquet, which otherwise might be lost in the barrel; still brandies so stored do not acquire the same characteristics as they would were they first stored in wood. Should the demands of trade be for colorless brandy, wood can never be used for storage. Small quantities of such brandies are best preserved in large glass demijohns, or wicker bottles. Larger quantities, however, may be kept in iron reservoirs well tinned, or in casks such as are used for the storage of gin. For transporting these white brandies, wooden barrels treated with paraffine on the inside may be employed.

This prevents the cask from giving a woody taste to the contents, or from coloring the liquor. Loss by leakage is also made next to impossible.

Though fine brandies constantly improve with long storage, their cost constantly mounts up, owing to interest, charges for storage, evaporation, leakage, etc. Consequently, it is only with the highest class of goods that a long period of storage is to be advised. It is better to artificially age inferior goods if need be, as with long storage the increased cost would not be compensated for by the increase in value. The means employed to age brandy artificially are very numerous. I will here enumerate only the more desirable ones.

With ordinary brandy, the character of old stored goods can be given in part by placing it in new barrels, which have been steamed before filling, and by allowing it to remain stored for many months in a warm or heated warehouse. When it has acquired the yellow-gold color, water is added to cut the proof to meet the demand of trade. Not only is the demand for the proof thus met, but the water imparts a certain mildness to the whole. For this blending distilled water is best, but the very clearest rain-water may be used. Enough brandy or neutral grape spirit should be previously added to the water to give it a total alcoholic strength of 10 per cent, and this can be kept in oak barrels until needed for use. Should the brandy contain too much tannin—absorbed from the packages—and taste harsh and astringent, this may be ameliorated by fining with gelatine. Care must be taken not to use too much of this, as it will remain suspended in the brandy and cloud it. This excess of gelatine can only be removed, in turn, by tannin. The quantity of gelatine that is necessary can be determined beforehand by a test on a small scale. Generally, not more than 5 grammes (77 grains) of gelatine will be needed for every hectolitre (26½ gallons) of brandy. After fining, the taste of the brandy will be found to have much improved, losing its harshness and rawness. Should the brandy not have a sufficiently deep color, it can be brought to the desired shade by the use of caramel or burnt sugar coloring. This substance cannot be recommended for general use, as it is easily detected, and once found the origin of the brandy will be open to suspicion. When no new barrels can be obtained to impart to the brandy the necessary taste and the characteristic color, the deficiency may be met by allowing oak shavings to soak in the brandy; or to let the shavings soak in the 10 per cent mixture of spirit and water, which is afterward to be used for cutting the proof of the brandy. Eight days' soaking will generally suffice for this purpose, and 10 kilogrammes (22 pounds) of shavings will be sufficient for every hectolitre (26½ gallons) of water.

The character of old goods can also be given to brandy by the addition of sal ammoniac. For coloring, burnt sugar may be used. A small portion only is needed for this purpose.

Sometimes different essences and bouquets are added to brandy to increase the bouquet. These are, however, mostly used in making imitations, produced wholly or in part from spirit. They will not be needed if care has been given to insure proper distillation and suitable wine has been employed in the still. However, with fine or even ordinary brandy, such additions are not to be recommended. If the bouquet and aroma are very deficient, they may be supplied by a little tincture made by treating vanilla beans with a little strong spirit.

Quite recently a practice has arisen of treating the new brandy with electricity. Good results have been claimed. Still, the experiments in that direction are not yet sufficiently complete and definite to enable me to give an opinion on their merits. For the present it is enough to know that such a process is already in vogue.

CHAPTER XI.

COOPERAGE.

The best barrels are made of good stone oak. This wood is not only less porous than other varieties of oak, but it contains less tannin, and it gives the brandy stored in such barrels the highest recognized qualities. In the Charentes the so-called white French oak of Charentes and Limousin is in high favor for packages. The ordinary size for packages for warehouse is from 300 to 600 litres (66 to 132 gallons). If long storage is contemplated, it is better to make the packages still larger, inasmuch as the loss is less. Casks of 300 to 400 litres (66 to 88 gallons) are best whenever the brandy is to be aged rapidly. For the warehouse the casks should be perfectly faultless, free from worm-holes, and the staves should be thick and well seasoned. Barrels with lighter staves may be used for transportation, but the wood must not have a flaw or fault. In France the customary transportation packages are the pipe (572 litres, or 125.8 gallons), the half pipe, the quarter pipe, and also the hogshead (228 litres, or 50.1 gallons). The transportation barrels must also be very carefully finished. In order to avoid any theft of brandy during transportation, it is the custom in many parts of France to cover the packages with coarse sackcloth.

All new barrels, and particularly those used in transporting the brandy, should be well steamed before filling, especially if fine brandy is to be transported or stored in them for any length of time. It is also to be recommended that all new packages be filled first with quick-aging, inferior goods, and then, if the law permits, use the packages for the finer article.

CHAPTER XII.

CONCERNING IMITATIONS.

As the consumption of brandy increases and the product of France diminishes on account of the destruction of the vines in the Charentes by phylloxera, the more is the imitation and adulteration of brandy resorted to.

It is attempted, first by the addition of "cognac bouquet" to inferior wine distillates, or to the ordinary spirits of commerce, such as are distilled from grain, potatoes, and beet molasses. Fictitious brandies made from such spirits, with the addition of water, essences, caramel, and sugar syrup, have nothing but the name in common with the article distilled from wine.

Quite a large part of the brandy found in the European trade is com-

posed of such a mixture. This article can only be driven out by the general extension of brandy manufacture in the various wine-producing countries. The connoisseur cannot easily be deceived by such imitations or adulterations, but even the less experienced can detect the fraud by the excess of sugar contents which is almost exclusively present in such an article.

As most of the commercial spirit which is used for the preparation of adulterated or fictitious brandy is not free from fusel oils, the fraud can be distinguished from the true article without fail by the odor. The best test is probably to rub a few drops of the brandy under examination in the hands and smell it; or, to place a spoonful in a porcelain evaporating dish, mildly heat it and light it. The alcohol burns out, leaving the watery residue and extracts, and partially the fusel oils. If the brandy is genuine the odor will tell it; if it was produced by the use of commercial spirits, essences, and sugar coloring, the fusel oils will stand out strong on smelling, and the odor of caramel will be noticeable. The taste of the residue is also widely different, artificial brandy being invariably colored by caramel. Brandy which is not so colored will not taste of caramel, the coloring being due to the extractive substances of the wood. The residue of such brandies will taste harsh and astringent, like tannin. Generally, the more that European brandies show the presence of caramel the greater doubt will exist as to their genuineness, just as the strong pronounced odor of œnanthic ether has its origin in a concocted bouquet or essence. In making a chemical analysis of the brandy for sugar the sample should previously be heated with an acid, to convert all the sugar into inverted sugar, as generally about half of the sugar in brandy is ordinary cane-sugar, all not being changed into inverted sugar in the process of making caramel.

By a chemical analysis the content of water, alcohol, fusel oils, and solid extracts can be ascertained, and from their relative quantity some idea can be formed as to the genuineness of the article. One of the surest tests is to have the brandy submitted to an expert, who can, by the sense of smell and taste, generally do more than any chemist toward pronouncing on the brandy.

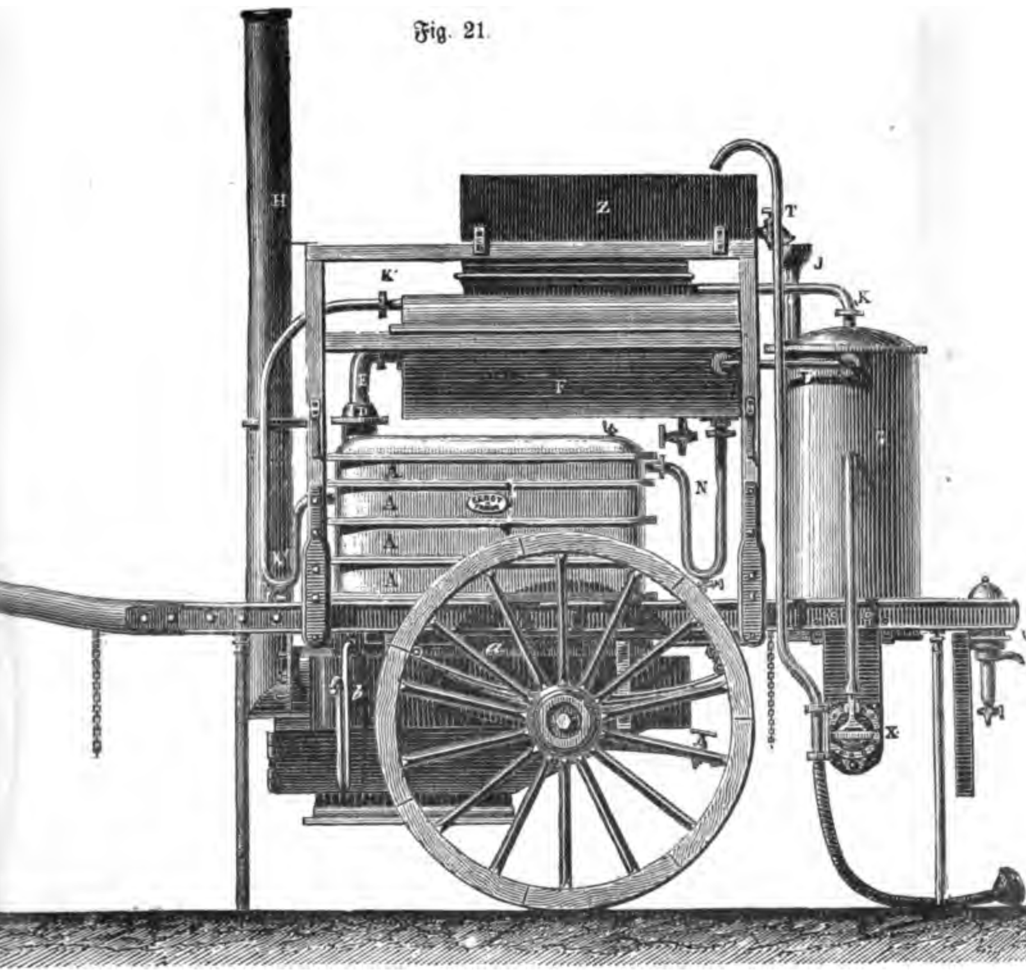
CHAPTER XIII.

HIGH-PROOF BRANDIES.

The high-proof distillate from wine is usually called wine spirits, or neutral grape spirit. Even when it is free from heavy fusel oils, which appear in lower proof brandies, the highest rectified brandy will still contain traces of light volatile ethers and alcohols, which distinguish all wine distillates.

Though it is possible to produce good wine spirit from every wine, still it is preferable to use only such wines for this purpose as are not suited for the manufacture of the better grades of brandy. Consequently, those heavy wines rich in alcohol, which at best will only yield an ordinary brandy, should be used, as well as sick, spoiled, and milk-sour wines, which give a useful distillate after repeated rectification, or after the removal of the fusel oils and deodorization of the spirit. Deodorizing, however, removes that peculiar wine aroma common to all distillates. As

Fig. 21.



it is of less importance to obtain an aromatic spirit than to get a high-proof product at one distillation, the arrangement of the still and rectifier is made to conform with the latter purpose, thus effecting a saving in time, labor, and fuel. This makes the continuous still a general favorite for the production of such spirits; and if the process is to be conducted on a large scale, it is the only one that can be profitably used.

Although a continuous still can be run just as long as the supply of wine holds out, it is desirable to stop it from time to time in order to give all the parts a thorough cleaning. Various separated albuminoids and protein substances will accumulate, particularly in the heater. They become insoluble by heat, and clog up the pipes, and to a less degree the still. In order to clean the parts less easily reached by hand, water may be run through the still. In starting up on wine proceed as indicated in the description of Fig. 16, mentioned before in this work.

Raw or low-proof brandy, as well as all fore and after runnings obtained from fractional distillation, and which may not be deemed suitable for fine brandy, can be worked into high-proof spirit with advantage.

This is especially true of raw brandy produced from sick or milk-sour wines which are difficult to distill into a good marketable cognac. Continuous stills are best suited for this work, and if working on raw brandy they can be run an indefinite length of time. If, however, this raw brandy is derived from pricked wine, it is best to neutralize the acid with an alkali, preferably soda, as already indicated in the production of brandy from such wines. If the low-proof brandy, to be redistilled, has been derived from spoiled or offensive-smelling wines, it ought to be deodorized before redistillation, in order that the offensive foreign odor may be removed.

Brandy made from lees, sediment, and pomace always has a very distinctive and pronounced specific odor, which cannot be mistaken for anything else, and which is next to impossible to remove, even by repeated rectification. Still, such brandies can advantageously and profitably be worked into a very good high-proof spirit. To do this they are distilled at once in an apparatus capable of producing high proof at one operation. The peculiar characteristics of pomace and lees brandy are obtained from the fusel oils contained therein, which are easily dissolved in alcohol of high degree. If water is added the fusel oils may be precipitated in small drops, turning the liquor cloudy.

If this reduced spirit is then subjected to rectification, the larger portion of the fusel oil remains behind, and the product is almost entirely free from the offensive fusel oils. The process may be improved by adding pulverized and glowing wood charcoal to the milky spirit before rectification. Linden or poplar charcoal, at the rate of 3 to 5 kilogrammes (6.6 to 11 pounds) for each hectolitre (26½ gallons), will be found best. This will remove the last traces of the objectionable odor. The diluted spirit, or brandy, is drawn off from the pulverized charcoal before rectification. By this process all of the fusel oils and offensive, odorous compounds are removed. The spirit, after this charcoal treatment, is indifferent to smell and taste, but is admirably suited for blending with wine distillates which are rich in aromatic ethers.

CHAPTER XIV.

STILLS FOR HIGH-PROOF BRANDY.

The apparatus for making high-proof grape spirits varies according to the raw product which is to be worked up, and whether the process is to be conducted on a large or small scale. For the production directly from wine the stills shown in Figs. 17, 18, 19, and 21 are well adapted.

Fig. 22.

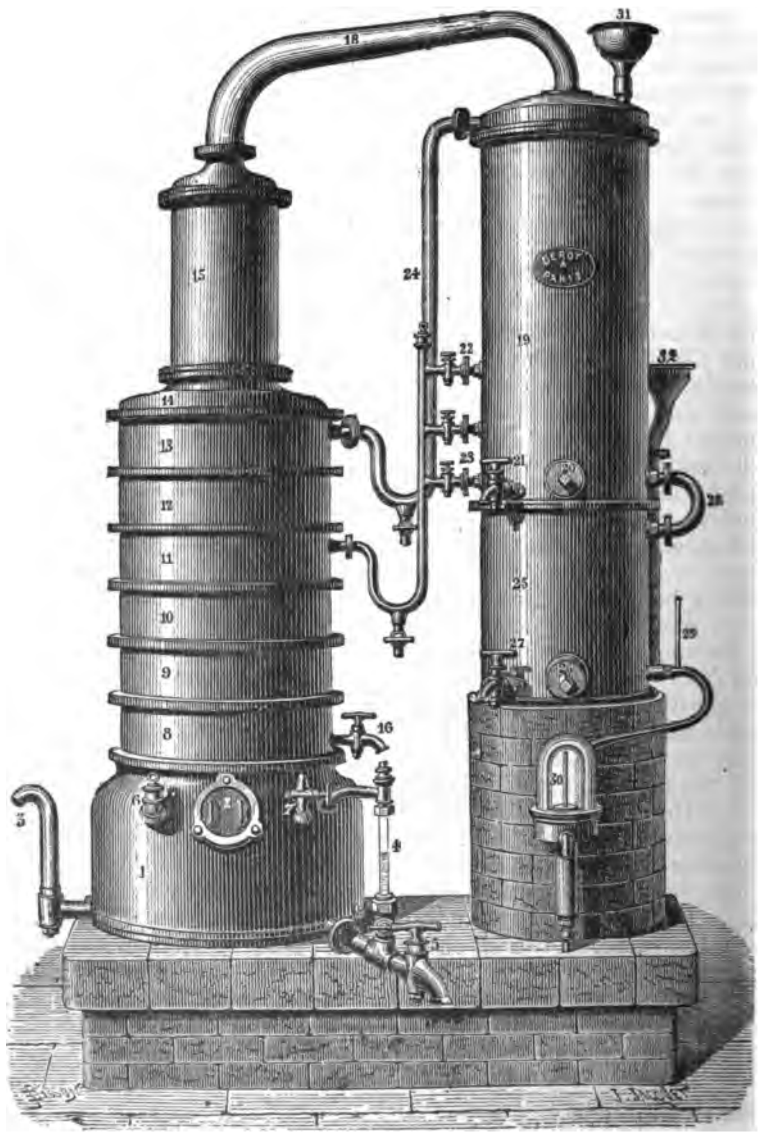
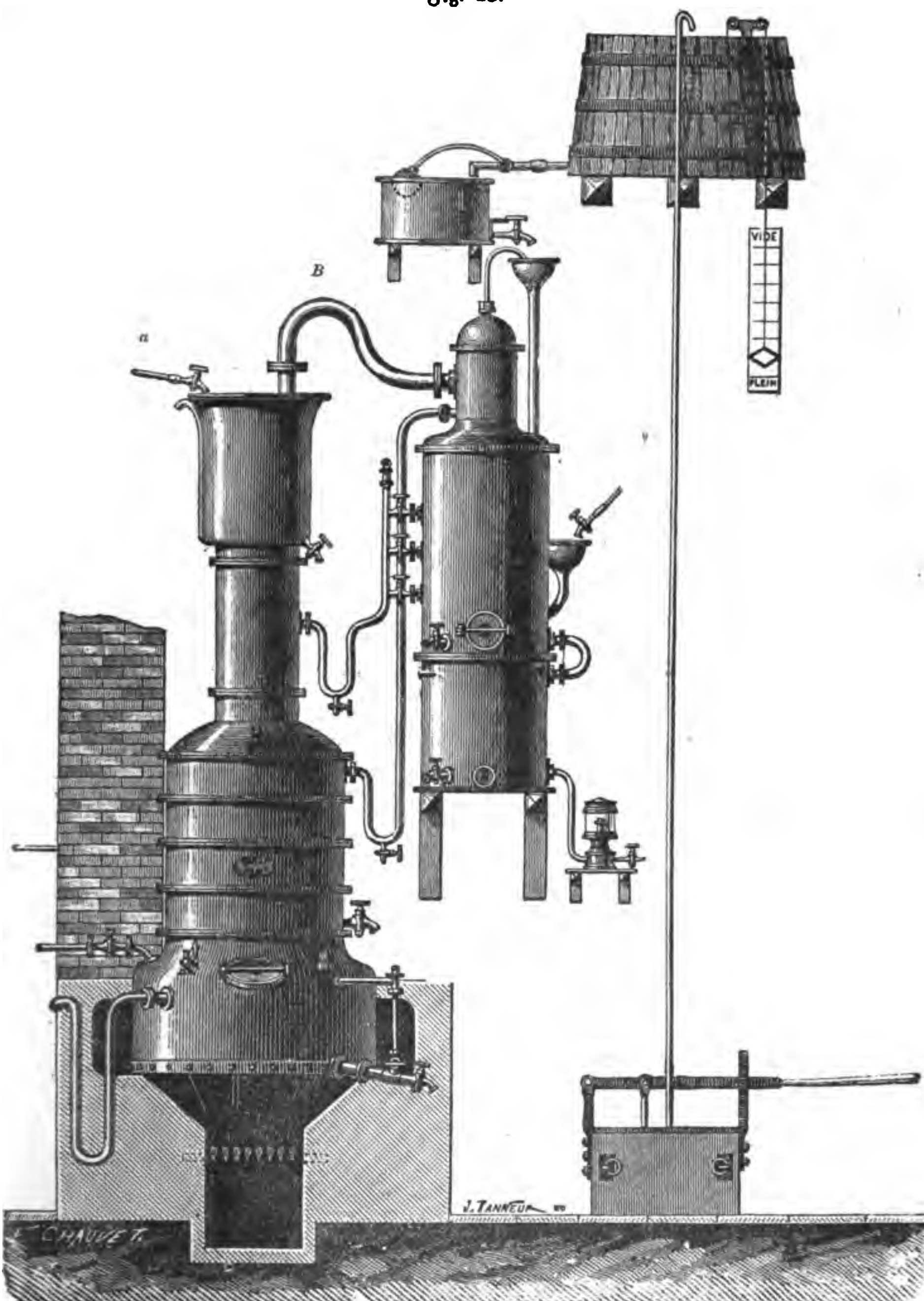


Fig. 23.



With the still shown in Fig. 13 a spirit of 90 per cent alcohol can be produced.

Another continuous still, suitable for operating on a large scale and fitted for steam heating, is shown in Fig. 22. *1* is the boiler; *2* the opening for cleaning it; *3* the tube through which the wine flows; *4* the tube indicating the height of the wine in the boiler; *5* the emptying faucet; *6* an opening for filling; *7* the aerating faucet; *8*, *11*, *12*, and *13* plates in the column; *9* and *10* are supplementary plates; *14* the helmet of the distilling column; *15* the rectifier; *16* a trial faucet; *18* the goose-neck; *19* the heater, with an opening, *20*, for cleaning it; *21* the emptying faucet; *22* and *23* faucets through which any low-proof brandy may be carried back to the boiler; *24* the pipe through which wine is carried from the heater to the still; *25* the cooler, with an opening, *26*, for cleaning the same, and *27* the emptying faucet. The pipe *28* connects the worm in the heater to the condenser; *29* is a safety pipe on the outside of the worm, which passes the alcoholometer at *30*; *31* is the filter pipe which conducts the wine to the heater, and *32* is the one for cold water. The smaller stills of this system are also arranged for direct firing. For every two degrees of alcohol in the wine to be distilled, one more plate is counted in the distilling column. Thus, a 10 per cent alcohol wine requires five plates for the column; and the six plates, as shown in the cut, will permit the perfect distillation of a 12 per cent wine. The process of operating is the same as previously described in other stills. Care must be observed, either with steam heating or direct firing, that the wine heats slowly at the beginning of the distillation until it boils, and also by a proper regulation of the heat and of the flow of wine into the still, that the distillate may run evenly in proof. Should the alcoholometer indicate that the proof is falling, the distillate should be turned back into the still until the proper proof is again reached. Some practice and self-confidence are required in the operator in order to obtain the best results.

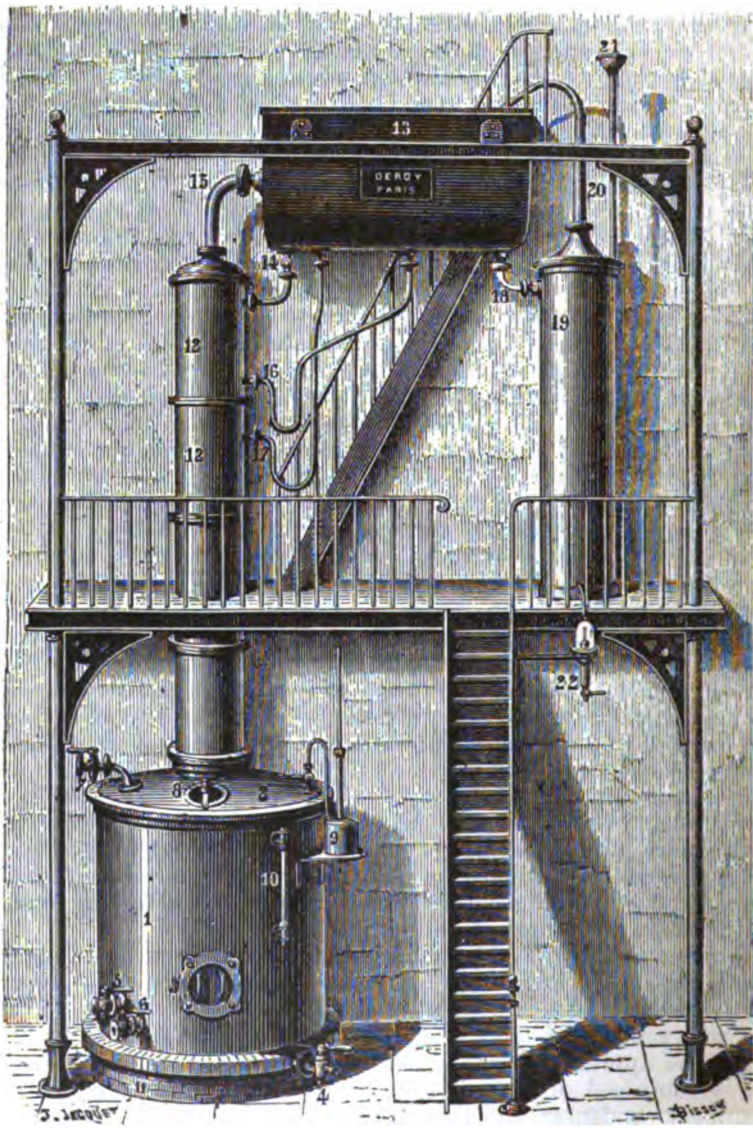
The continuous still of Egrot (Fig. 19) can, by adding a rectifier, be so modified as to produce a 90 per cent spirit with a single operation. Fig. 23 shows such a distilling apparatus with the rectifying helmet of Egrot. The still is arranged for direct firing. The rectifying helmet is surrounded by a cooling cloak, to which water is conducted according to requirements, through a conducting pipe.

If only a small quantity of high-proof spirit is to be made from pomace, lees, or once distilled spirit, the smaller apparatus (Fig. 13), with the rectifier, can be used without any changes.

For production on a large scale, steam heat will be found very advantageous, the application of which will be found in Fig. 24. This apparatus is composed of four principal parts: The boiler, the rectifying column, the condenser, and the cooler.

1 is the boiler; *2* the upper portion of the same, and *3* and *8* openings for cleaning; *4* is the emptying faucet. Through *5* steam can be admitted in the boiler, and *6* is the outlet faucet for the condensing water; *7* is the inlet for the raw brandy to the boiler; *9* is an indicator of the tension in the apparatus, and *10* shows the height of the liquid in the boiler; *11* is the brick base of the boiler; *12* the rectifying column, composed of twenty-six plates; *13* the reservoir for the rectifying worm; *14* a pipe through which the rectifying column can be washed with cooling water from *13*; *15* the pipe conducting the alcoholic vapors to the

Fig. 24.

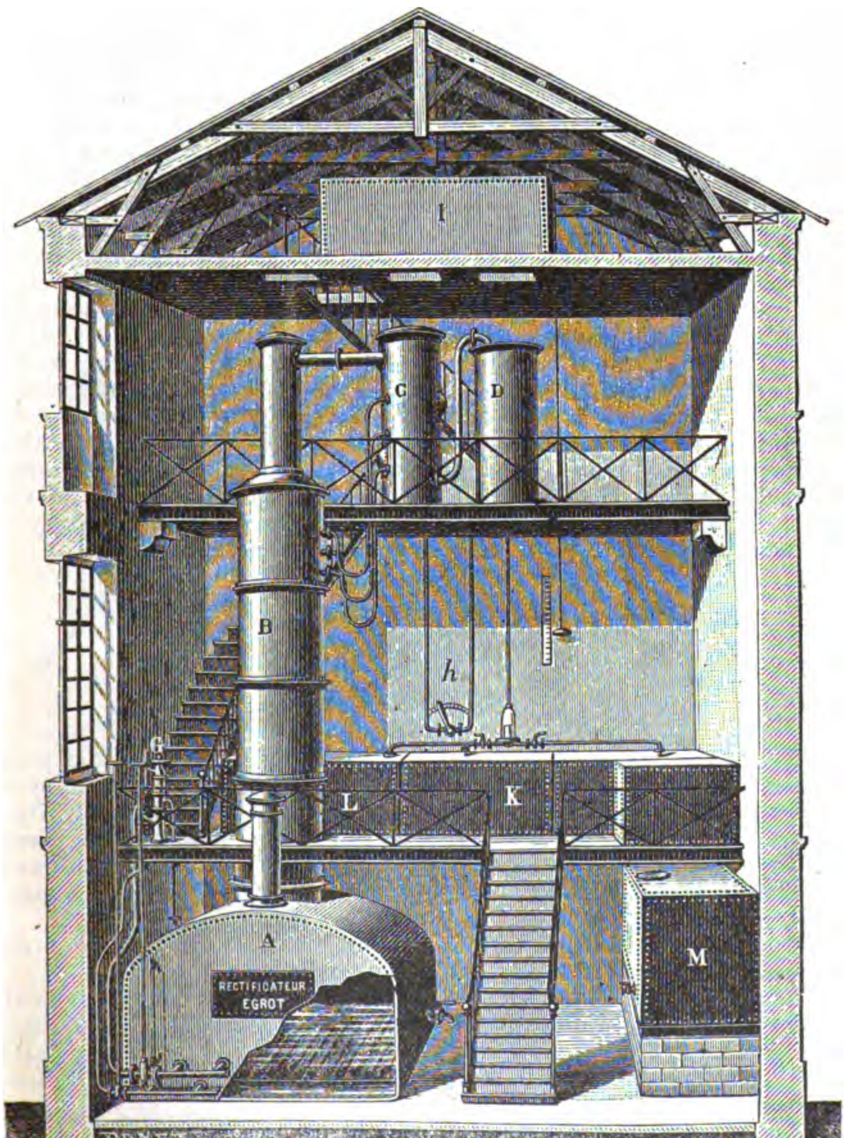


rectifier; *16* and *17* the retrograde pipe; *18* the pipe conducting the alcoholic vapors to the worm; *19* the cooler; *20* the overflow pipe carrying the water from the cooler to the reservoir with the rectifier; *21* a funnel pipe carrying the water to the cooler; *22* the outlet for the distillate with the alcoholometer.

When using this still the heat is started slowly, and the first distillate which goes over, composed of alcohols and ethers 78 degrees Reaumer (208 degrees Fahrenheit), is put aside. This is of special importance,

as the first run usually communicates a bad taste and odor to the distillate which follows. The best spirit shows 92 to 95 per cent of alcohol. As soon as the distillate shows 90 per cent at the outlet, the runs which follow should be caught separately. The distillation is continued as

Fig. 25.



long as the alcoholometer indicates any alcohol in the distillate. The after runs are treated to a new rectification. The results of this rectification depend upon the skill with which the distillate is handled.

After finishing distilling the boiler must be emptied and cleaned prior to refilling and distilling again. For this purpose the boiler is completely emptied through the faucet *4*. The lock *3* is opened and the bottom and sides of the boiler should be brushed thoroughly to clean out all the fusel oils. Then the charger *14* is opened so that the inflowing warm water from the reservoir *13* will remove the substances that may be deposited on the plates in the column. After cleaning it is rinsed out with water and distilling can be again resumed.

Another rectifying apparatus constructed on the Egrot system is shown in Fig. 25. The latter is also arranged for steam heating. *A* is the boiler in which the steam worm can be seen, by means of which the liquid is made to boil; *B* is the rectifying column; *D* is the cooler; *G* the automatic regulator for steam heating; *h* is the regulating faucet for the cooling water; *I* is the cooling reservoir; *K* is a reservoir for the raw spirits to be rectified; *L* is the reservoir for the spirit with objectionable taste, and also for the fore and after runs; and *M* is the reservoir for fine spirits. By means of the new rectifier of the Egrot system, it is possible to produce a neutral spirit of 96 to 97 per cent alcohol from raw brandy or once distilled spirit. The arrangement of the apparatus is much the same as that of other rectifiers. The boiler *A*, as shown in the drawing, is of a peculiar flat form. The heating worm lies perfectly horizontal in the inside of the boiler, so that the steam can enter equally at several places. On this account the liquid contained in the boiler is equally heated. The rectifying column contains a large number of plates, decreasing the necessary height of the column. The advantage is that with a less height of the column and of the boiler, less space is required, and at the same time a larger quantity of fine neutral spirit can be produced with less consumption of fuel.

CHAPTER XV.

POMACE BRANDY.

The pomace of grapes is composed of skins, seeds, some cellular pulp of grapes, and also of the stems, when a stemmer has not been employed in wine making. Pomace also contains some grape juice, no matter what care may have been observed in pressing, and how powerful the press. The quantity depends to a great extent on the power of the press, and on the quantity of sugar in the grape, for the richer in sugar the more must remain in the pomace.

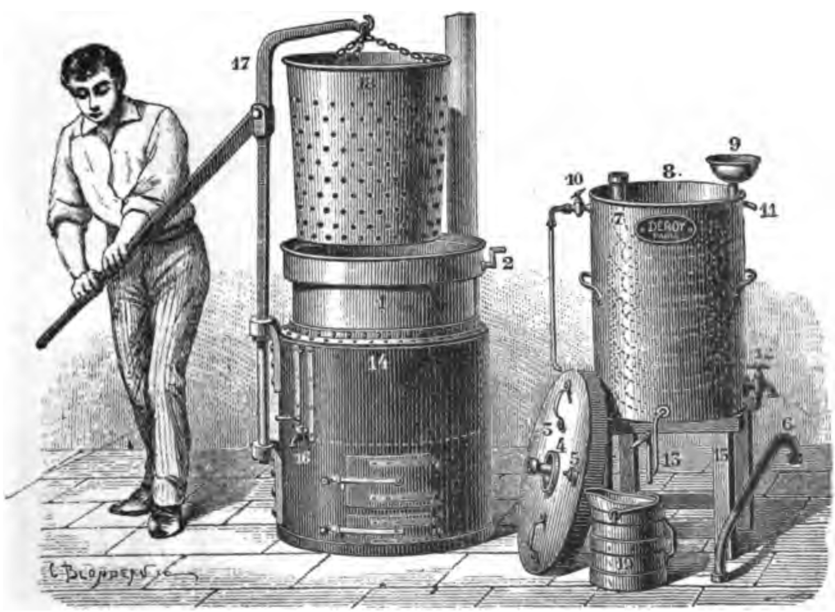
The relative percentage of stems, skins, seeds, etc., in pomace, must necessarily vary with locality and other conditions.

The composition of the separate parts of pomace is next considered. The skin contains cellulose, tannic acid, coloring matter, etc. The seeds carry from 6 to 7 per cent of tannin, and from 10 to 20 per cent of fatty oils. The stems in the main consist of cellulose and water with tannin, and some malic acid.

Pomace intended for distillation should be preserved in such a way that the alcohol contained cannot escape. When removed from the press and exposed to the air, it often heats up within twelve hours so that the larger part of the alcohol is lost, and some vinegar is formed

through fermentation. In order to avoid this, the pomace as it comes from the press should be pressed into large vats, or upright barrels from which one head has been removed. Any large receiving vessel will do. It can even be kept in a board-lined ditch in the ground, made water-tight by clay or loam. When vats are used it is to be recommended to keep them in a cool place. The main object of all methods is to avoid as far as possible the admission of the air, and the consequent escape of alcohol. Unless this is observed the pomace will be rendered perfectly valueless for distillation on account of acetic fermentation. When pressing into the vats, the pomace must be evenly spread, and pressure applied when a layer 20 centimetres (7.8 inches) in thickness has been laid down. The top may be covered with a layer of damp loam or clay a few inches in thickness, which must be kept damp to prevent splitting or breaking. A simple way is to cover this loam layer with a few inches of sand, which is dampened occasionally. If the pomace is placed in ditches in the ground, it should be covered with boards, which are in turn covered with clay.

Fig. 26.



If the pomace comes from unfermented must, openings should be left in the clay or loam layer to permit the escape of the carbonic acid gas due to fermentation. Otherwise, the gas would force its way through the covering. The openings may be closed as soon as fermentation ceases.

When the pomace is needed for work it must be taken layer by layer from the vats or ditches before a new layer is touched. If ditches are used for storage, they should be as narrow as possible to keep out the air as far as may be.

Fermented pomace contains very widely different quantities of alcohol, because this depends not only on the original sugar content, but on

the amount of pressure to which the pomace may have been subjected. The taste of pomace brandy is due to the excess of fusel oils in the stems and skins. The quantity is influenced, of course, by the variety of grapes from which the pomace came, and the manner of distillation. Thus, if pomace is distilled in ordinary stills with a direct fire, burning is almost unavoidable, and a consequent offensive taste is to be noticed. However, the danger of burning can be lessened by adding water in large quantities and by stirring frequently. It is also lessened if the helmet of the still is not placed in position until the water begins to boil; but this involves a larger expenditure of fuel and the loss of some alcohol. It is, therefore, most advisable to distill by the application of steam, particularly when large quantities of pomace are to be worked up. If only small quantities are to be made up, the stills (Figs. 11 to 14) can be used, a perforated copper false bottom being placed in the boiler so that the pomace will be kept a few centimetres from the bottom. The boiler, with the heater of the Deroy system (Fig. 12), may also be used, but the heater *16* must be filled with water instead of wine, and the water is used for pouring over the pomace.

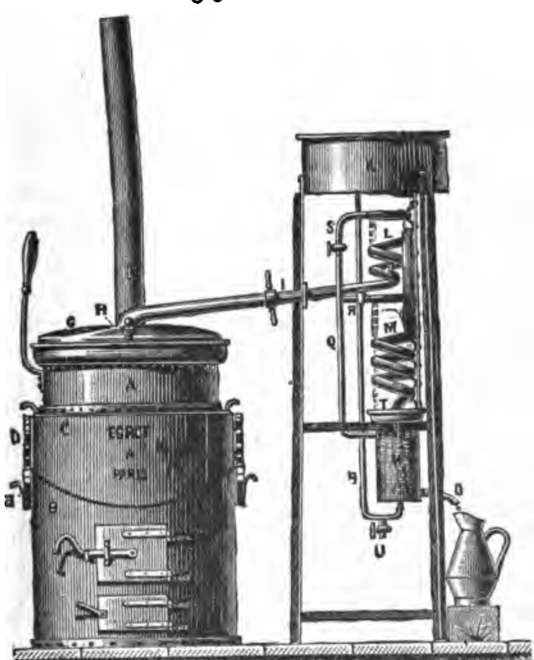
Fig. 27.

In pomace distillation the still should permit rapid filling and discharging. Wide cylindrical boilers, with an easily removable cover, are indispensable. For this purpose the stills have devices attached to make the work easy. Fig. 26 shows such a pomace boiler of Deroy, which is fitted with a perforated cylinder made of copper, and smaller than the real boiler. This leaves a space between the walls and at the

bottom. By means of a lever, the filled cylinder can be easily inserted or removed, as shown in the figure. *17* is a crane or lever to move the cylinder *18*. The boiler cover, or hemlet, *3*, leans against the cooler *8* in the above drawing. In other respects this still is like those used for the distillation of wine.

To empty the pomace after distillation an arrangement is to be recommended which will permit of handling by a single person. Fig. 27 shows the way that such a boiler with such an overturning device can be emptied. In Fig. 28 the latter boiler is mounted and ready for distillation. The latter, constructed on the Egrot system, differs from other similar ones in the construction of the cooler, which requires little water. In the drawing *A* is the boiler; *B* the iron stove; *C* the removable portion when the boiler is to be emptied by turning over; *D* and *E* the turning device; and *G* the helmet forming the covering of the boiler. The closing is effected by water. *H* is the screw lock for the filling opening; *I* is the connection of the goose-neck and worm; *K* is the reservoir for cooling water; *L* and *M* is the copper worm covered with coarse linen on which the cooling water falls; *N* is the cooler for the last division

Fig. 28.



of the worm; *O* is the outlet for the condensed distillate; *P* the water-conducting pipe from the reservoir to the cooler; *Q* is the pipe conducting the water to the worm; *R* and *S* are regulators of the flow of water, and *E* catches the water coming from the worm.

When a distillation is to be made with this still, the pomace is placed in the boiler, the cover is inserted, and water placed in the gutter around

the top, making a hydraulic closing. The goose-neck is connected with the worm, *R* and *S* are closed, cold water is placed in the reservoir *K*, and the fire lighted. When the contents of the boiler begin to boil, and the pipe *L* is warmed, *S* is slowly opened, so that the water falls like rain on the worm. A separation of alcoholic vapors now sets up, and as these are partially condensed, the heavy fusel oils flow back into the boiler, and only the relatively pure alcoholic vapors reach the worm *M*, where they condense, and after being entirely cooled in *N*, flow out at *O* as a clean distillate.

During the entire distillation *R* should remain closed. When rapid distillation is desired, and no rectification needed, *S* is left closed and *R* is opened. By so doing the worm *L* is not cooled, and the condensation is all effected in *M*, and the lower-proof distillate flows out as before at *O*. With this still it is therefore possible to produce a high or low-proof brandy at will.

When the distillation is over and the boiler is to be emptied, the goose-neck is unscrewed from the worm, the cover *G* is taken off, *C* is removed, and the boiler can be emptied by turning over, as seen in Fig. 27. One man can easily empty a boiler of 10 hectolitres (265 gallons) in this way.

Fig. 29 is a still of the Egrot system, which is mounted on an iron cart, and can be transported to any place. These will be found very profitable whenever the laws of a country will permit transportation from place to place, and when the pomace is produced only in small quantities it is best to distill right then and there than to transport to a central still. Both time and money and other expenses are saved. With single distillations brandy running from 60 to 70 per cent of alcohol can be obtained from pomace by the use of these stills.

The quality of pomace brandy depends in great measure on the skill and care of the distiller. When direct firing is employed, water must be added to the pomace when it is placed in the still. To well-pressed pomace about one third of the volume of water is enough, but if the pomace has not been well pressed, one fourth to one fifth is a sufficient addition. The water is placed in the boiler before the pomace. As with any other distillation the firing must be constant, but not too strong.

If the pomace produces a very raw, rank product in spite of every care, it is to be advised to produce a low-proof brandy and treat it subsequently to rectification. A fractional distillation will be found best for this, to remove the offensive taste of the fore and after runs.

A pomace wine can also be made from the pomace before distillation is resorted to at all, and the wine thus obtained can be distilled. As the manufacture of this wine is beyond the scope of this work, I refer the reader to my work, "The Use of Wine Residues," 2d edition, Vol. XXVII, of Hartleben's Chemical Library, where this subject is treated in an explicit manner.

When a large quantity of pomace is to be distilled, steam should by all means be used. There are many different stills adapted to the use of steam and specially fitted for this purpose. As with stills on the small scale, one of the foremost requisites is that the still shall permit of rapid filling and emptying. With two or more stills in a set, the operation by the use of steam can be made practically continuous. Steam also permits the employment of tightly fitted oak, instead of copper, as a material for making the boiler.


POYET

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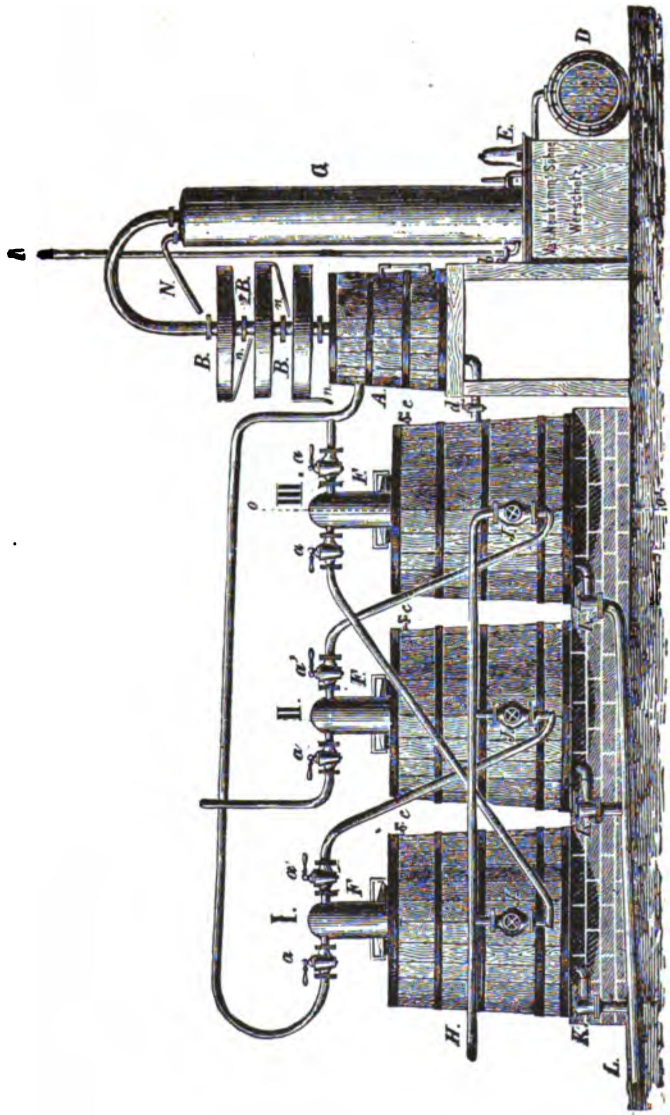


Fig. 30.

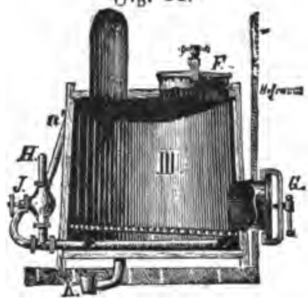
Such a pomace still, with oak boilers and fitted for steam, as constructed by B. Neukomm, is shown in Figs. 30 and 31. The latter is fitted for continuous operation, so that two of the boilers are always in operation while the third is being emptied and filled.

The apparatus is composed of three wooden boilers, I, II, III, each one having a capacity of about 560 litres (123.2 gallons). *A* is the package in which the spirits are received; *B*, *B*, *B* are three rectifiers; *C* is the cooler; *F*, *F*, *F* are small filling doors of the boilers, the emptying doors not being visible, as they are situated at the back. In Fig. 31 the emptying door *G* may be seen. *H* is the steam pipe; *J*, *J*, *J* are

steam closing ventilators; *K*, *K*, *K* are the outlet faucets; *L* is the conducting pipe for the distilled liquid; *c*, *c*, *c* are sampling faucets; *d* the outlet pipe for the once distilled spirit; *M* the inlet pipe for cold water, and *b* the faucet to regulate the flow of the water. The faucets *a*, *a'* are to cut off the boiler not in action or to make all the boilers communicate. *N* is the water flow from the cooler to the rectifier.

The distillation is conducted as follows: All of the three boilers are filled with pomace, and all the faucets and openings for charging are closed. Steam is then turned into the boilers slowly through the pipe *H*.

Fig. 31.

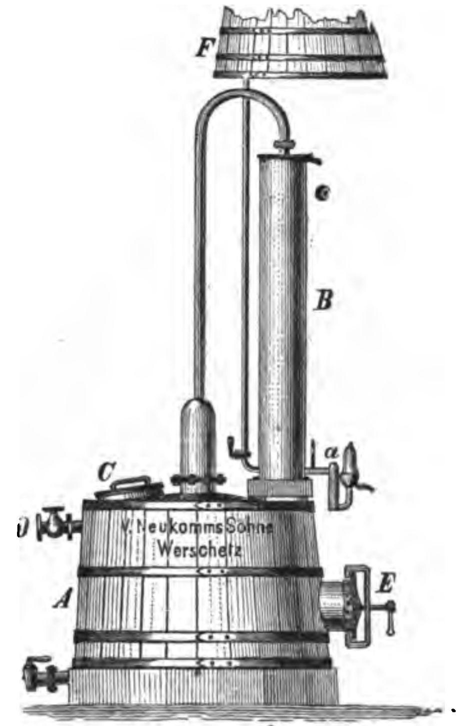


After this, boilers I and II are opened, whereby the steam enters boiler I and heats up the contents. The alcoholic vapors soon begin to rise. Steam then enters II and the distillation proceeds there as well. The spirit eventually reaches *A*, and thence it goes to the plates *B*, *B*, *B*, where the poorer vapors condense. The richer alcoholic vapors reach *C* and are entirely condensed there, flowing out at *D* as a high-proof distillate. As soon as the alcoholic vapors reach *C* the water faucet *b* is opened in order to allow cold water to enter. The position of this faucet can be changed, as a stronger or weaker product is desired. When the still has been operating about an hour, a trial should be made to ascertain whether or nót alcoholic vapors are still being developed in I. This can be done at *c* by use of a small rubber tube. If no alcoholic vapors are detected the valve *J* of boiler I is closed, and the faucet *a* of boiler III, and *a'* of boiler II are opened. The faucet *a* of boiler II, and *a'* of boiler I are closed. The valve *J* of boiler II is opened so that the two boilers II and III are in operation, while I is cut off entirely. I is then emptied through the door *G* (section cut Fig. 31), and the boiler can then be refilled with pomace. Before emptying, the liquid in the boiler should be drawn off through *K*.

After another hour has elapsed, a test should be made at boiler II, to ascertain if all of the alcohol has been driven from the pomace therein contained. If so, boiler II is cut off in the same manner as boiler I was previously cut off, and boiler III is put in connection with boiler I, in the same manner as III was before connected with II. Boiler II is now emptied and filled. Subsequently a test is made of the contents of boiler III, and the process thus goes on uninterruptedly.

By this process the brandy practically goes through two distillations. Once the operation is started up, all the steam that enters the still first strikes pomace, which has been partially treated, and then goes to fresh pomace in the next boiler. Here some condensation of the alcoholic

Fig. 32.



vapors is bound to occur, but the vapors and alcohol are afterward driven off by the later operations. The pomace will continue to give up alcohol in a still of this size anywhere from forty-five minutes to an hour and a half, according to the first content. If each of the three boilers contains 560 litres (123.2 gallons), from 4,480 to 8,960 litres (985.6 to 1,971.2 gallons) of pomace can be handled in twelve hours. By enlarging the size of the boilers, the capacity can be increased. Such a still will keep two men busy all the time emptying and filling the boilers.

If smaller quantities of pomace are to be treated, a still such as is shown in Fig. 32 will meet all requirements.

This still is also fitted for steam heating, and the boilers, as before, are of wood.

A is the boiler; *B* the cooler; *C* the charger; *D* admits the steam; *E* is the emptying door; *F* is a reservoir of cold water, from which the cooler is supplied. The boiler of this apparatus holds 560 litres (123.2 gallons), and the time for distillation ranges from two to two and one half hours, according to the quality of the pomace. The still can be made portable.

Such a portable still is shown in Fig. 33. It has three boilers, which work by turn, two being in operation while the third is being emptied and filled. In this still *1* is the steam boiler; *2*, *2*, *2* are the boilers; *3*, *3*, *3* are the covers of the same; *4* is the vessel into which the alco-

holic vapors first enter; *5, 5, 5* are the chargers; *6* is the charger of the connecting pipes; *7* admits the steam to the distilling vessels; *8* is the faucet for the steam boiler; *9, 10, 11* are goose-necks; *12* is the cooler, and *13* the doubler; *14* is the outflow for the distillate with the alcoholometer; *15* is the funnel for cold water, which is conveyed through the pipe *16; 17* is the smokestack, and *18* the feeding pump for the steam boiler. This apparatus will handle large quantities of pomace, and the mode of operation is very simple.

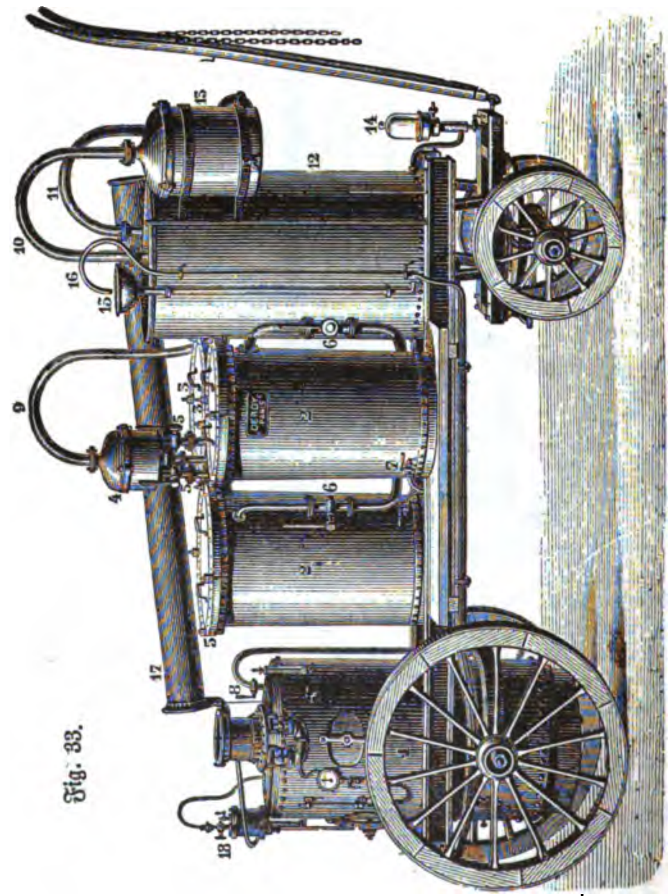


Fig. 33.

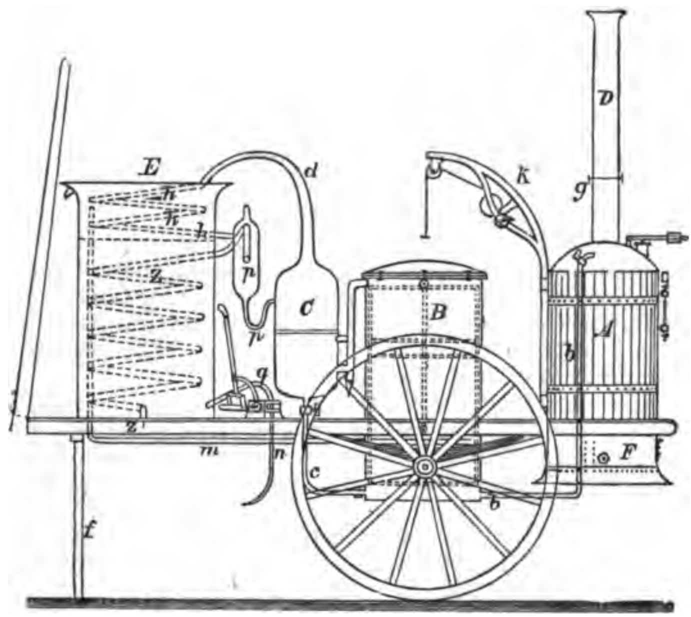
The size of the distilling vessels usually varies from 300 to 500 litres. They can be made of any desired size. The management is the same as in previously described stills with wooden boilers, two being in operation while the third is being emptied and refilled.

A pressure equal to two atmospheres in the steam boiler will generally be found sufficient for all these stills. If necessary, more than three wooden boilers can be put together in one series.

Another transportable still for pomace distillation is shown in Fig. 34. This is also designed for the use of steam, and is constructed on the system of Villard Rotner. It is placed on a two-wheel cart. The steam is

produced in *A*. *F* is the firing-box, and the chimney *D* goes through the boiler. *B* is a cylindrical still, in which the pomace (resting on four perforated plates) is introduced or removed by means of the crane *K*. The doubler *C* is cooled by the outer air. The distillate after passing through *C* goes through *d* to the cooler *E*, where a partial condensation takes place. The higher alcoholic vapors are condensed in the worm *Z*.

Fig. 34.



G is a pump for filling the cooler with cold water. The water warmed there is used for renewing the water in *A*, to which it is conveyed by the pipe *m*.

The alcoholic vapors are partially rectified in the top portion of the pomace, and all the spirits that condense in *C* go back to the still by means of the pipe *c*. With this still, 15 to 17 litres (3.3 to 3.7 gallons) of brandy of 50 to 52 per cent alcohol can be produced in an hour, including the time expended in filling and emptying the still.

CHAPTER XVI.

UTILIZATION OF POMACE.

Pomace contains valuable constituents aside from alcohol. The most valuable of these is the tartar, and in countries where the high revenue wanted by the Government may prevent the use of pomace for brandy distillation, it is advisable that the extraction of the tartar be undertaken. Red wine pomace will usually be found the richest in this salt. It is crystallized from a liquid obtained by treating the pomace with

hot water. Pomace so treated can be used as feed or fuel. The latter object is accomplished by molding the pomace into cakes the shape of tiles, say 8 centimetres thick and 25 centimetres in diameter. The pomace should lay some time in a heap before being molded; the cakes thus formed are then thoroughly dried. They make a fine fire, giving an even heat, and a strong, lasting flame. When used for fuel, expenses of distillation are considerably reduced. The ashes are rich in potash, and make fine manure. To enumerate the many uses to which pomace can be put, is beyond the scope of this volume, and the reader is referred to the second edition of my work, "The Uses of Wine Residues," published by A. Hartleben, for further consideration of this subject.

CHAPTER XVII.

LEES BRANDY.

"Lees" is the bottom deposit which settles in alcoholic fermentation. It contains, besides some solids, ferment organisms, or fungus, and some alcohol. The lees are formed and separated in the first fermentation of the must, and later in the second fermentation. The quantity ranges from 4 to 8 per cent of the young wine.

Next to the tartar, the lees are the most valuable of the residues incident to wine making. They are precipitated, because less soluble in alcohol than water. Some of the tartar is inevitably precipitated.

The wine carried with the lees is, of course, as good as that from which the lees were derived. Prior to their being placed in the still their value should be ascertained. If any acetic fermentation has set in in the wine, the lees are of very little value. A sample distillation may be made in the still described in Fig. 6. When this has been done their value will be known. If not intended to distill them at once, care must be taken to preserve them. This can be best done in wine barrels, in which small doors have been placed to permit of their being emptied easily. The barrel should not be too large, and the casks should be kept full up to the bung. Exception is made when the lees are still gently fermenting, when a fermenting bung is used. Barrels which cannot be completely filled should be strongly sulphured. Pressed and pasty lees should, however, be worked up as soon as possible.

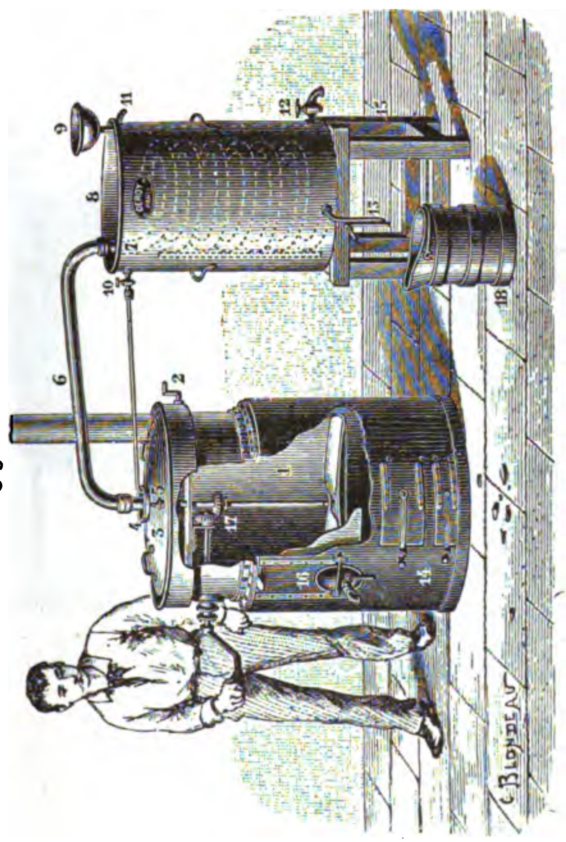
Large barrels are always to be avoided, to prevent possible heating. Barrels of 1½ to 2 hectolitres (39¾ to 53 gallons) capacity are ample.

Lees brandy is much more aromatic than that from pomace. The quality depends on the wine from which the lees came, and the skill of the distiller, as well as the time that the lees have been kept. Pressed or pasty lees should always be worked as soon as possible, as any changes in the chemical composition before working must inevitably result disastrously to the profits of the distiller. A bad taste is also generally imparted to the brandy.

Whether the lees should be pressed before distillation or not depends on the locality and conditions of the distiller. As liquid wine lees are generally too thick to permit of rapid work, water must be added, or, under peculiar conditions, even an inferior wine may be substituted. The stills used for pomace may be used for lees if large quantities are

to be worked up, and the boilers had best be filled only two thirds. If the direct firing system is to be used instead, the liability to burning the lees is largely increased. In old stills this drawback is attempted to be obviated by a vigorous stirring of the lees until the bulk begins to boil. The helmet is then placed in position and the goose-neck connection is made. This method is, however, incomplete, as not only part of the alcohol is lost, but later burning when the distillation is in progress is

Fig. 35.



difficult to avoid. A stirring apparatus then becomes desirable, and such a one is shown in Fig. 35. This is the Deroy system.

1 is the boiler; *2* is the water outlet for the hydraulic closing of the boiler cover; *3* is the boiler cover; *4* is for distributing the cooling water of the cover; *5* is the opening for filling, with a screw-closing device; *6* the goose-neck; *7* the worm; *8* the cooler; *9* the funnel for cooling water; *10* the regulating water faucet; *11* the water overflow; *12* the emptying faucet for the cooler; *13* the outlet of the worm; *14* the iron stove; *15* the stand for the cooler; *16* the emptying opening with the emptying faucet of the boiler, and *17* the stirrer.

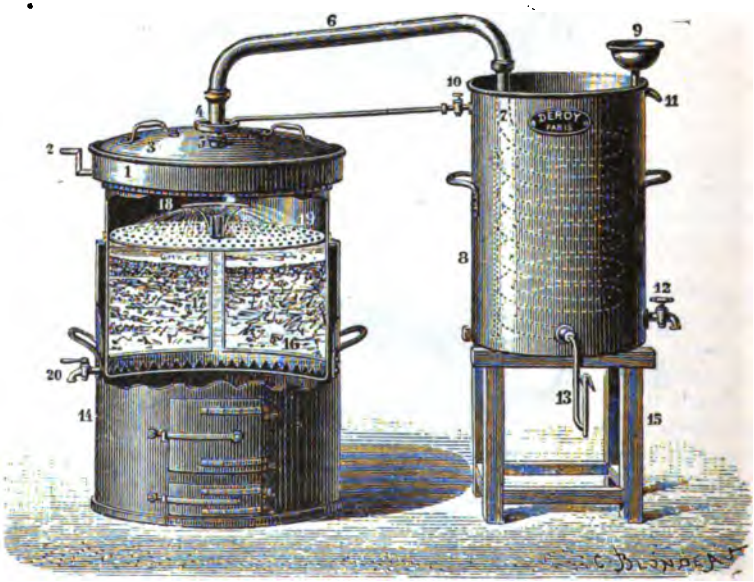
The stirrer is inserted through the boiler walls through a packing box, and is attached to a horizontal carrier. By means of two gear wheels

the movement is transmitted to an upright axle, which carries two paddles. These in turn stir the lees at the bottom of the boiler.

Another still, answering for working up pomace or lees, is shown in Fig. 36 (Deroy system).

It is the same in general as those which have hitherto been described, except that it is provided with an arrangement to keep the boiler contents in constant motion, and thus aids rapid and even heating and distillation. It is provided with a second movable bottom *16*, which has a tube in the middle, and carries a perforated copper plate *19* near the mouth.

Fig. 36.



The second movable bottom does not lay directly on the boiler bottom, as a copper grate is inserted underneath. Before proceeding with the distillation a certain quantity of water is poured into the upper tube *18*, and the bottom between is filled with the lees or pomace. The cover *3* is then adjusted and the fire under the boiler is started. As soon as the liquid between the two boilers begins to boil the vapors escape through *18* to the top, and thence distribute over the perforated cover *19* equally. The heated lees are forced into the space between the two bottoms, and in a short time distillation sets up. The boiler contents are kept in constant circulation. The evaporation is even and thorough, making a much more aromatic distillate than would otherwise be attained.

As already stated, steam is by all means desirable in distilling large quantities of lees. For this purpose the steam stills (Figs. 30, 32, and 33) are well suited.

CHAPTER XVIII.

ŒNANTHIC ETHER.

After the alcohol has been secured from the lees by distillation, the residue contains œnanthic ether and various nitrogenous substances. This residue, therefore, has some commercial value, which can be obtained with little care and cost.

Œnanthic ether (also called brandy oil, or lees oil) is a component part of all wines, giving to them that characteristic wine smell. It may also be found in certain brandies, and in fact may be used in making artificial brandy, but it does not impart to them that characteristic odor and flavor which gives them their value. Œnanthic ether was isolated by Liebig and Pelouri in 1836; but, notwithstanding it gives the peculiar wine smell common to all wines, it must not be mistaken for the bouquet of wines.

In a concentrated state, crude œnanthic ether has an intensely offensive odor, and it is only when greatly diluted that the agreeable wine aroma is developed. Perfectly pure, it is colorless and flows easily, and has a sharp taste. It is easily soluble in diluted alcohol, but does not dissolve in or mix with water. The specific gravity is .85 at 20 degrees Centigrade. It is volatile at a very low degree, and when distilled with water, from 10 to 12 grammes (154 to 184 grains) will go over with each kilogramme (2.2 pounds) of watery vapor.

It boils at 225 degrees Centigrade (437 degrees Fahrenheit), and, consequently, little goes over with wine distillates, and less and less goes over the more the alcohol is rectified. It is essentially a fermentation product, and the higher the temperature at which the fermentation is carried on, the more œnanthic ether will be formed.

It is often adulterated, usually by mixing with absolute alcohol. This adulteration is easily detected by mixing some of the suspected liquid with olive oil, and shaking. If alcohol is present it will separate out by quiet standing. This test is so satisfactory that the addition of only a few per cent of alcohol is readily detected. In order to obtain the ether from wine lees after the alcohol has all been secured, the fire is increased, whereby the œnanthic ether usually escapes with the water, and with it is condensed in the worm, separating in the watery distillate in the form of black drops, which accumulate on the surface of the distillate. The process is stopped when no more of these drops form and the presence of the ether can no longer be detected by smell.

Thus obtained, the wine oil is a black liquid, with an offensive odor. Redistilled in a small still, it becomes perfectly colorless, like water. As the distillate is expensive, and is in constant demand, the utilization of pomace and lees residue will be found profitable. The oil should be made wherever the laws of the country will permit. The product averages usually 20 to 40 grammes (30.8 to 61.6 grains) from every 100 kilogrammes (220 pounds) of liquid treated.

The lees residue, after distillation, still contains such salts as tartar, etc. The tartar can be extracted if deemed advisable. Of late the manufacturing has been carried on on a large scale.

Fig. 37 shows a filtering press for lees after distillation. It is composed of a number of frames which are provided with a perforated frame on one side. Between every two of these frames a closely woven press

cloth is laid, and then these frames are pressed close to one another with a screw, whereby as many filtering chambers are formed as filtering frames are brought into use. By means of a strong pump the liquid in lees is pressed through the cloth. The solid parts are retained and the liquid flows out through the faucets of the individual chambers. When the flow ceases, the lees will be found as a pasty mass.

Fig. 37

This paste can always be used either as a manure or as fuel for firing under the boiler. The ashes can be utilized in making potash. The liquor pressed from the lees will be found to contain tartar.

CHAPTER XIX.

INSTALLATION OF DISTILLERIES.

It is impossible to give exact detailed rules to suit all conditions which may arise in the installation of distilleries for making cognac, high-proof brandy, or pomace or lees brandy. This not only varies with local conditions, the material to be worked up, the size of the intended distillery, but also the demands of the revenue laws of the country in which the distillery is to be started. The first and general requirement, of course, is that the distillery must be so located as to permit of construction under favorable conditions of cost, that the place of storage be easy of access, that the long transportation of materials be avoided, and that the bye and waste products can be readily removed and utilized.

In small distilleries it is advisable that the still be in the immediate vicinity of the winery. The water supply must be steady and ample. When steam is to be used, as in large distilleries, the steam boilers must be near, and the necessary pumps, etc., run by steam power. Electric lighting will be found most desirable for a night run. The smaller distilleries may be operated at any vineyard, but the larger distilleries must eventually depend upon the product of many vineyards for their material. In laying out and installing a new enterprise, the services of an expert will be found of the utmost value in this as in any other commercial venture.

Taking into consideration the fact that the consumption of brandy is increasing constantly, and that the production in France is considerably reduced, the subject of distillation augments in importance in all vine-growing countries. Even if the French vintners are making efforts to reconstitute their vineyards by planting American vines, time will be required to attain anything like the old production, and in the meantime trade prejudices can be dissipated and friends for outside products made.

Wherever an abundance of light, cheap wines, which are sold with difficulty, are produced, there the question of distillation is one of importance; and it is always possible, there, to produce a more valuable and salable product than the wine. Even in countries which readily dispose of their wines, a lucrative distilling business can be developed.

The distillation of pomace and lees brandy is of interest everywhere, because, no matter what the locality, it offers a means of augmenting the financial returns from the vineyards. There is also a certain gain from the cream of tartar.

GRAPE SYRUP.

APPENDIX A

TO THE

ANNUAL REPORT

OF THE

Board of State Viticultural Commissioners

FOR 1893.

SACRAMENTO:
STATE OFFICE, : : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
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CONTENTS.

GRAPE SYRUP.

INTRODUCTION.

It has only been within the past two or three years that any particular attention has been given to the production of grape syrup in California in considerable commercial quantities. The boiling of must has been carried on by many wine makers on a small scale, and the product has been worked up in several wineries and wine cellars in winery and cellar work. The production of a first-class syrup for table and culinary purposes seems to have just begun, and there are now two or three manufacturers who are producing the syrup for such uses, who are having a remarkable success in placing the same upon the market.

Within the past year several parties have given close attention to the problem of producing syrup by vacuum process. This study has been rendered all the more important by the fact that the raisin grape growers of the San Joaquin Valley, and other parts of the State, are looking forward to the production of syrup and the manufacture of brandy as a means of disposing of the immense quantities of second-crop raisin grapes now produced in the State. These raisin growers and packers propose, if it is feasible, to open up a large market in the United States for grape syrup; to use their first crop of Muscat grapes in making raisins, and the later crops for syrup and brandy. It is conceded by all these growers that there will be every year, for some years to come, an increasing output of raisin grapes, which must either be made into raisins and thus glut an already overstocked market, involving those who have already embarked in the business into serious difficulties and losses, or that new outlets for sale must be discovered and utilized.

The second crop seems to be particularly adapted for making syrup. In the San Joaquin Valley the grapes run high in sugar, and the peculiar flavor of the Muscat is not nearly so strongly developed in the second-crop grapes as in the first. Every experimental test which has been made has shown that the Muscat grape is reasonably successful for syrup making, the product being strongly marked with Muscat characteristics. Experience has shown that American consumers like this Muscat flavor, whether in wine or brandy, and there is every reason to believe that they will take kindly to the same flavor when it is found in a first-class delicate syrup.

It must not be supposed, however, that only the Muscat can be made into good syrup. Almost every ordinary wine grape which has been allowed to become fully ripe can be made into a very agreeable tasting article, which meets with ready sale. At the works of Mr. F. Albertz, in Cloverdale, various red and white wine grapes are used, and without exception the product is agreeable in every respect.

Two of the greatest problems that the syrup makers will have to contend with, are the elimination of the natural acid of the grape and the clarification of the product.

The free acid which is contained in the grape, as well as the potassium acid tartrate (cream of tartar) may be removed from the must before the syrup is boiled, or after the process is over. The removal is effected by the use of lime in one form or another, whether it be marble, chalk, or limestone. The reaction by which the free acid is removed is that which occurs whenever an acid touches a carbonate. Carbonic acid gas is given off, and the lime enters into combination with the acid, whichever one may be present. In the case of the grape, tartaric and other fruit acids are present, and when lime is added salts of lime are formed. In the reaction, all or nearly all of the potassium acid tartrate is converted into the neutral tartrate. The tartrate can then be removed by standing or settling, or ordinary filtering. The syrup or must, as the case may be, is clarified in the same operation.

The syrup maker also has to contend with the possibility of fermentation, either of his must before he begins the operation, or of his product in case the concentration of the juice has not been carried far enough. If he removes the acid from his must before boiling, he takes the risk of fermentation setting in; and in case the least fermentation begins, his must is deteriorated in value for his work. Nevertheless, most syrup makers who manufacture syrup for the table have deemed it best to remove the acid before boiling, as the filtering is more easily done than when the operation is deferred until after the syrup is made. Another advantage is, that if the removal is effected before boiling, the metallic parts of the apparatus are less liable to the attack of the fruit acids.

Many of the syrup makers, and those who have been experimenting with the various processes, are of the opinion that the acid should not be entirely removed, as a certain small percentage of acid in the syrup gives a certain zest or piquancy to the product, making it more palatable to the consumers. If the acid is entirely removed the syrup has a flatter taste, and is not so attractive or palatable. There is too much acid in the natural grape must, however, to take the risk of placing the syrup on the market without the removal of some of it. It must be remembered that the concentration of the must by the boiling, concentrates the acid, and some samples of syrups which have been made experimentally in the Santa Clara Valley, show this effect very pronounced.

As to the possible market for the syrup, it must be said that the Pacific Coast is not a specially promising one. The demand on this coast is for heavy, raw, sugar-house or glucose syrups, which run about 68 per cent sugar, and which are variously designated as "drips" or what not. There is a certain unpleasantness in the taste of all these syrups, but nevertheless they have a large sale on account of their cheapness. The best market for fancy syrups, such as this grape syrup must naturally be considered, is in the East, and it would seem that if the syrups were properly introduced by the makers in the thousand and one ways which would suggest themselves to shrewd advertisers, they would have a ready sale. Their effect upon the system is undoubtedly much more beneficial than that of ordinary syrups. They are mildly laxative in their properties, and have all the advantages which come from the well-known grape cure. For this reason alone they should commend themselves to all discriminating buyers, as well as for their delicate flavor and other properties.

Experience has shown that they should run from 65 per cent to 68

per cent of sugar for the market. If they run over 72 per cent, they are liable to grain out in peculiar masses and forms, and thus reduce the value of the syrup as a commercial article. It must be remembered that grape sugar is invert sugar, and that all the boiling in the world will not keep the syrup a syrup after the point of the dissolving power of the water is passed.

CHAPTER I.

PROPERTIES OF GRAPE SUGAR.

Grape sugar is known under a variety of names, among others, glucose, fruit sugar, etc. Its chemical formula is $C_{12}H_{24}O_{12}$, and exists in two forms, which are distinguishable by their action on polarized light. The dextro-glucose turns the plane of polarization to the right, and the lævo-glucose turns the plane to the left. Dextro-glucose is grape sugar, but the two occur together in grapes, and are usually known as invert sugar. Dextro-glucose separates from its aqueous solution, by slow evaporation, in white, opaque, granular, hemispherical, or cauliflower-shaped masses and disks. From a solution of 95 per cent alcohol, it separates in sharply defined needles. It is much less soluble in water than cane sugar. One hundred parts of water at an ordinary temperature, say 17° C., which equals 63° F., will dissolve 81.68 parts of glucose. In boiling water it is soluble in all proportions, forming a very sweet syrup, which, however, is not as ropy as the syrup from cane sugar. It is not so sweet as cane sugar, two and a half parts, according to Prout, having the same sweetening power as one part of cane sugar. According to Dubuimfau, the proportion is two to one. Lævo-glucose is a colorless, uncrystallizable syrup. It is as sweet as cane sugar, and taken alone is purgative, while with the dextro-glucose this effect is very much modified.

These properties of the two forms are given in order to post any syrup maker on these points, in case they should arise.

CHAPTER II.

APPARATUS FOR MAKING SYRUP.

Any ordinary vacuum pans, such as are used in sugar houses or on sugar plantations, can be used in making syrup, but one modification must be insisted upon. The pans, if made of iron, must be tinned on the inside, or covered with copper, or even with silver. In the large factories which are now being erected in Europe for making concentrated grape must, the tinning has been abandoned, and the machines are now lined with silver. Iron is quite rapidly corroded by tartaric acid and cream of tartar, and cannot be used in contact with the solution. Copper is but little acted upon, and is a very satisfactory material for lining. The same is true of tin. Prof. W. B. Rising, the State Analyst, says that, under ordinary conditions, copper is to be preferred to tin in the pans.

Up to the present time all the grape syrup produced in California has been made in the old-fashioned manner, in open pans or tubs. The process is very primitive, and all the syrup made in such manner is open to the liability of acquiring a burned taste, due to unskillful management, or to natural conditions. As long as the syrup is to be used for sweetening sweet wines, this is not entirely objectionable, but a first-class table syrup should have nothing of this taste about it, or its value will be very materially decreased. The vacuum process, in one form or another, is always to be preferred. It is economical of fuel, and the boiling is accomplished at a very low temperature, it being well known that as the atmospheric pressure is reduced the boiling point of water is correspondingly reduced.

Another advantage which the vacuum process has is that the syrup will certainly be better in color than in the open process. In a vacuum apparatus the color can be made that rich amber which is so desirable in the sale of the product; while in the open process the contact with the air during the boiling, invariably produces a blackish colored syrup. This will militate against any sale for table purposes.

CHAPTER III.

VACUUM PANS.

Herewith are given three cuts of vacuum pans, such as are used on cane sugar plantations for concentrating cane juices after expression from the cane, and also in sugar refineries. These pans are such as are manufactured by the Squier Company, of Buffalo, New York, the Risdon Iron and Locomotive Works, of San Francisco, and the latter's representatives in Honolulu, Hawaiian Islands. They may be taken as typical sugar-house pans, and can be used with advantage in making grape syrup with certain unimportant modifications.

Fig. 1 shows a vacuum pan used in the sugar houses for evaporating juice to the graining point. It can be mounted on one or three platforms, as convenience dictates. It can be arranged so as to operate with direct steam or exhaust steam, as desired. The vacuum pump is shown in this cut.

The coils within the pan are of copper. The shell of the pan itself, shown in the cut, is usually made of cast-iron in the cane sugar houses, but must be made of copper in grape-syrup making, or lined with copper, tin, or silver. The shell is covered with walnut or ash strips, as shown, securely held in position by brass strips. The sizes of these pans vary from three to twelve feet in diameter.

Fig. 2 shows a double-effect vacuum concentrator, for reducing juices to the graining point. In sugar houses these double-effect concentrators are arranged in conjunction with a grainer, in which the raw sugar is crystallized, but this grainer is, of course, not wanted in a syrup works. The vacuum pump is shown below the concentrators.

Fig. 3 shows a triple-effect concentrator with the "grainer," also used in the sugar houses. The grainer is, of course, superfluous in syrup making. The heating tubes inside are, of course, of copper, and are arranged vertically. The tubes spread out at the top and bottom, so as

to permit a large heating surface being exposed to the liquid inside. In the triple-effect, arrangements are made so as to permit the operation of any two concentrators while the third is being cleaned. This is done without stopping the operation. The tubes in the concentrators are arranged vertically, so as to permit easy cleaning.

The operation of these multiple effects is very simple. On the plantations the juice is first treated with lime and passed through defecators, which remove most of the foreign matter from the juice. The juice is then drawn into the concentrator farthest from the grainer, and direct steam turned through the tubes inside. The vacuum pump is started, and the juice is soon boiling. Fresh juice is added from time to time, so as to keep the concentrator nearly full. When concentrated to the desired point, the juice is drawn into the second concentrator, and the concentration carried further, the steam from the first concentrator supplying the needed heat. This is carried on until the juice is made to go to the third concentrator, and so on. The operation is thus continuous, and the juice is brought to the graining point with the least expenditure of heat.

Very frequently four or more concentrators are used. At the Western Beet Sugar Company's works, at Watsonville, there are four concentrators through which the juice passes before going to the grainers, where the sugar is finally granulated.

In adapting these plants to the needs of grape syrup makers, but few changes need be made. There should be the apparatus for removing the acid from the must, and for straining the must before allowing it to enter the concentrators, and, as before stated, the inside of the pans should be so as to permit only a copper, tin, or silver surface to come in contact with the juice. The rest of the process is easily learned and put into practice, the same as on cane plantations.

CHAPTER IV.

AMERICAN CONCENTRATED MUST COMPANY'S WORKS.

The works of the American Concentrated Must Company, which are located at Geyserville, are admirably suited for the manufacture of syrup, although they were originally erected for making concentrated grape must for shipment to Eastern States and to Europe. These works are in operation during every vintage, and in the fall of 1892 about two thousand tons of grapes was handled. The must is taken while it ran from, say 20 to 22 per cent of sugar, and the concentration is brought to 80 per cent strength, the product being a pasty mass, which is shipped in barrels to the buyers, whether East or abroad. No attempt is made to remove the acid from the must, and indeed this is not desired, as the must is used in ordinary wine making on arrival at its destination, and the acid is naturally wanted by the buyers. With a device for removing the acid, consisting of settling tubs and some lime, and with pains taken not to carry the degree of concentration so high as at present, an excellent syrup can be produced at the factory.

Figs. 4 and 5 show half-tone plates of the interior of these works, taken from a photograph. The apparatus consists of two large vacuum

pans, the construction of which is shown in Fig. 6. In the works the vacuum pump is between the two pans, and not as shown in Fig. 6; but this is merely a matter of detail, and is of no consequence. The pans are strongly built; hold about two thousand gallons each, and are tinned on the inside to prevent corrosion by the acid. In the bottom is shown a series of tubes, through which steam passes, and which brings about the boiling of the must. The size of the pans is shown in Fig. 6, together with details as to the size of the condenser.

When the apparatus is put into operation grape must is introduced. Steam is then turned in through the tubes, and the vacuum pump is put into operation. The atmospheric pressure inside of the pans is reduced to such a point that the must often boils at a temperature of 115° and 120° F. The steam which passes off is condensed in the condenser by a continuous stream of cold water. Care must be taken that the must always covers the tubes in the bottom of the pan during the operation. When the must reaches the desired state of concentration it is drawn off. Fresh must is introduced at any time desired, by the suction arising from the work of the vacuum pump.

The details of the construction of the pan will be seen from the drawing in Fig. 6, and the plates, Figs. 4 and 5. This apparatus was designed by Dr. Ferdinand Von Springmuhl, and while the company which operates it was not immediately successful, the last two seasons have been all that the stockholders could desire. The company is now contemplating constructing a new apparatus from drawings by Baron A. Von Schilling, who has charge of the Geyserville property. This new apparatus will be built in accordance with some new ideas which several years of experience have shown to the Directors of the company. The concentration *in vacuo* is not the only point which is considered by this company in making their must, and other apparatus is needed for preparing the juice before condensing, in order to make the best quality of must now desired by the wine makers of Europe. The œnologists of Europe say that the best wine, from a hygienic standpoint, can surely be made from the must, and the ready sale which the American company has had for the product will undoubtedly deter them from engaging in syrup making. They have made a success of their must, and have no reason to change for the present.

CHAPTER V.

YARYAN SYSTEM.

Some years ago Thomas D. Cone erected a small apparatus for making concentrated must, under the Yaryan system, in California. At the time he had no expectation of making grape syrup, and the machine, while it did its work properly, was not a success here from a business standpoint. It was designed by the Yaryan Company, of Toledo, Ohio, and after passing out of Mr. Cone's control was for some time owned by the late Charles Krug, of St. Helena, and is now at the Vina Vineyard of Senator Stanford. The Yaryan Company has made many improvements in the construction of machines on their system of evaporation, and their machines now have a large application in sugar

houses, glycerine works, glucose factories, etc. Figs. 7 and 8 show the general construction of the machine designed by Mr. Yaryan for sugar-house work, and consequently applicable in making grape syrup. Fig. 7 is from a photograph, and Fig. 8 shows the side elevation. This machine can be used not only for concentrating grape must, but for fortifying sweet wines, and even for producing grape spirit from all material, except pomace, ordinarily found about a winery. The apparatus is composed of the following parts: Supply tank, or feed box, with an automatic device attached to regulate the feed; a feed pipe, coil, separating chamber, vapor pipe, condenser, vacuum pump, tail pipe, and syrup pump, together with proper steam and water connections, which are not shown. The coil in which the boiling is done is constructed of copper pipes within iron pipes, and is so put together as to make two continuous horizontal coils, one within the other. Steam is admitted between the copper and iron coils, and the vacuum is produced by pumping within the copper coil. In operation the feed is admitted continuously to the inside of the copper coil, and the liquid begins to boil at once. The vapor formed drives the liquid along until it is discharged into the separating chamber, where the vapor and liquid separate. The vapor is drawn over the vacuum pump, and the concentrated liquid is removed through the tail pipe. The operation of the apparatus is automatic and continuous, taking the fresh grape must from the crusher or press, and when properly fed and regulated it discharges the grape syrup in a continuous stream at any desired density.

Some of the advantages which are claimed for this apparatus, when used in making grape syrup, are as follows:

First—As it sets on a form of its own it can be placed on the floor anywhere convenient for steam and water connections.

Second—It is automatic in its action.

Third—The grape must is boiled *in vacuo*, at a low temperature, and as the material is a very short time in passing through the apparatus, no burned taste or dark color is given to the product.

Fourth—The apparatus is simple in its construction and operation, and the connections are so simple that any one that makes grape syrup in an open kettle can easily learn to make it in this apparatus, and can produce a finer and more desirable product.

Fifth—The apparatus can be easily and quickly cleaned by passing a jet of steam through it.

The Yaryan Company has now had a sale of over one hundred machines, based upon this principle, in America and Europe. The apparatus has only a very small quantity of liquid in it at any one time, but the circulation is very rapid, and the daily capacity of the machines already in use is about two million eight hundred thousand gallons.

CHAPTER VI.

SANDERS' SYRUP MACHINE.

Sanders & Company, of San Francisco, have designed a machine for syrup making, which was experimentally successful on second crop Muscat grapes, as late as December 20, 1892. The tests were made in C. K. Kirby's vineyard, at Fowler, Cal.

The machine is shown in Fig. 9. It is in reality a combination of small pans, each being only about two inches deep, and which are combined so that the machine will operate continuously, the must running in and the syrup discharging without stopping the process.

It also heats and partially evaporates the liqueur with the vapor from the liqueur already evaporated, thereby condensing a good deal of the vapor, and saving work for the vacuum pump.

It not only has a large amount of heating surface, but also a large surface to draw the vapor from, thereby causing evaporation very easily.

The machine consists of I, a column containing a number of boiling chambers, each having a heater, with inlet and outlet for steam; an outlet for vapor; an inlet, outlet, and overflow for liqueur; drainage plugs; hand-holes, which are covered with glass so the inside can be seen; water gauges, etc.

Connected with this column is the condenser II, which is a closed tank, containing a number of pans; III is the heater; IV is the feed tank; V is the gravity tester; VI is the condenser and vacuum pump.

Valve *a* is connected with the tank containing the liqueur to be evaporated. To operate this evaporator the vacuum pump is kept constantly working, and cold water is run in the condenser to condense the vapor, which, with the air, is drawn off by the pump. By opening valve *b* the liqueur is drawn from the tank IV (which is being fed automatically) into the heater, where it is heated with the vapor coming from the pans and passing through the pipes. These pipes are flat, so as to obtain large heating surface in small space, and having very little room for must, which only fills the heater to the pipe *c*. The top pipe is thus covered with a thin layer, say about one sixteenth of an inch, so that the water will evaporate very easily. The must, with the vapor, then passes through pipe *c*, on the top pan. These pans are so arranged that the vapor from the column passes through, and the must over them, dropping from one pan to the next, until it reaches the lowest pan, where it flows through the pipe *d* into the column. In this way the pans are covered with a very thin layer of must. The must, after having passed over the pans, has already lost a good deal of water, and now runs into the top chamber of the column, where it is further evaporated with the aid of the steam heater. Each chamber fills with must to the overflow pipe *f*, through which it drops to the next chamber, where it undergoes the same process, until it reaches the lowest chamber.

The vapor from the lower chamber does not come in contact with the must in the upper chamber as in a still, but passes through the pipes *h* with the vapor in the upper chamber into the pans, pipes in the heater, and through pipe *i* into the condenser and pump. It will be found that the must in the lowest chamber, having been evaporated the most, contains the largest percentage of sugar, and leaves the pan through pipe and valve *j*. It then passes into the tester, where a saccharometer is placed to ascertain the amount of sugar the syrup contains, after which it is then withdrawn through pipe *k*. If the syrup in the tester should not have enough sugar, it can be drawn back into the pan by opening air valve *l*. In case of overboiling in any chamber, the vapor pipes are so arranged that the overboiling liquid must drop to the next chamber. To stop overboiling in the whole column, cold must is drawn in the top of the column through pipe *m*.

In case of a sudden stoppage of the machine, or if it is not advisable

to receive any more must in the column, which keeps running from the pans, by opening *n* the liqueur is drawn in the small tank VI, and can afterwards be drawn in the heater again. If the feed tank should become empty without any one's knowledge, valve *o*, which is self-closing, prevents the air from getting into the pan. If convenient, the pan should be about twenty-five feet above the ground, but if the height cannot be obtained it can be arranged so that it will operate with less. This pan is easy of operation, no expert being required to explain its workings. It is lined with a heavy coating of block tin, no lead or solder being used where it is exposed to the must.

Although it resembles Sanders' continuous still, brandy cannot be distilled with this evaporator, but it will be advisable to have a distillery in connection with a syrup factory, to distill those parts of the grape which cannot be utilized for syrup.

CHAPTER VII.

OPEN PAN AND TUB PROCESSES.

There are many wine makers in California who have rigged up machines of one sort or another, to make syrup, either for wine making, or as, in the last two or three years, for table purposes.

One manufacturer, Mr. F. Albertz, of Cloverdale, has opened up a fairly large trade in the Eastern States for a syrup made in tubs, and considering that grape syrup has been an almost unknown article in households, his success from the first is very gratifying to him. His syrup is rather dark colored, as will naturally happen when made by this process, but skillful management has enabled him to escape the effect of burning, which is so constantly met with.

Fig. 10 shows a half-tone plate made from a photograph of the inside of his syrup factory, which factory itself is located in a wing of his winery, and has been rigged up at a very moderate cost. This factory may be taken as a typical one, in which the tub process is employed. There are no shallow pans for final evaporation, such as are employed in the Yolo Winery, at Woodland, and which will be described farther on.

Fig. 11 shows the side elevation of his three tubs, 1, 2, 3, together with connecting pipes for turning steam into the coil at the bottom. These tubs have a capacity ranging from fifteen hundred to three thousand gallons, and in the bottom rests a coil, which is shown in the cut and in Fig. 12. This coil is a copper pipe and is for heating the liquid in the tubs. In the center of each tub is a shaft *b*, to which is attached four wings, *a*, *a*, *a*, *a*, which, when the steam is turned through the coil, are kept constantly in motion, though slowly, by the belt shown in the half-tone plate, Fig. 10, the belt passing around a solid wooden wheel. The wings mentioned above prevent the burning which has been found so difficult to avoid by other manufacturers. A cross-section of the tub is shown in number VI of Fig. 11. The construction will be readily comprehended from these drawings.

The manufacture of a syrup can be begun and ended, if desired, in one tub, but Mr. Albertz usually reduces the must in three operations; for instance, in tub No. 1 he reduces the must from 22 to 40 per cent

of sugar, in No. 2 from 40 to 65, and in No. 3 from 65 to 72. He runs through one charge in forty-eight hours, running day and night, and the operation from beginning to end is continuous. Mr. Albertz does not remove the acid from his syrup until the final concentration is effected. The syrup is taken from the tub when sufficiently high in sugar, lime is added, and the mixture is allowed to digest several hours. The syrup is then filtered and the product is ready for the market.

Snavely & Baker's works are built on an entirely different principle, and are located at their winery in Woodland. Neither Mr. Snavely nor Mr. Baker have any confidence in the tub process, and they state they have obtained their best results by using an open pan process from beginning to end. Fig. 13 shows a half-tone plate of their works at their winery, and Fig. 14 shows a new copper pan which they have devised for work next season. Their pans are arranged in two different ways: one for direct firing, and the other for application of steam. Fig. 15 shows their steam pan. This pan is fourteen feet by five feet in size, and is four inches deep. The outside is a wooden frame, and the pan is subdivided by a number of wooden parts, *a*, *a*, *a*, *a*, a cross-section of which is shown in the accompanying figure. These are so arranged that the bottom slit of *a* alternates so that the grape must, which is introduced at *b*, for instance, passes over the entire surface of each compartment before running out at *c* as syrup.

The bottom of the pan is a large copper sheet, and immediately below this, at a distance of about two inches, is an iron false bottom. This gives the machine an open chamber under the entire bottom of the pan, and the boiling is accomplished by turning the steam into this chamber as required. This pan will make about two hundred gallons of syrup every twenty-four hours.

The plan of the pan shown in Fig. 14 for direct firing is shown in Fig. 16. The sides are of wood, and the syrup in moving from one end of the pan to the other, has to pass over the entire surface of the pan. This pan is about sixteen feet long by four feet wide, and the ends and sides are six inches deep, although the small partitions *a*, *a*, *a*, *a*, are about three inches in height. The pan is of course made of copper.

At this place it is customary to remove the acid before boiling. The must is allowed to settle for ten hours with lime, in a closed vessel, and care is taken to avoid any possibility of fermentation. The syrup usually runs 68 per cent of sugar. Syrup making has been conducted at this place for about thirteen years, and the product, while dark colored, is very palatable and has a steady sale in the vicinity. It is also largely sold to wine makers and merchants.

Situated in Woodland, a few blocks from Snavely & Baker's winery, is the syrup plant of the Yolo Winery, which was not in operation during the season of 1892, but at which many thousands of gallons of syrup have been made. These works can be described as a combination of the Albertz tub process and the steam pan process of Snavely & Baker. The acid is removed from the must before boiling, and in no instance is the must allowed to go into the tub until it has settled several hours. Each tub has a copper coil in the bottom for heating the must, but there are no stirrers, as in the case with the Albertz tubs. The first, or highest, tub seen on the right of Fig. 17 has a capacity of about twelve hundred gallons. The boiling is carried on in this tub until the syrup shows 40 or 45 per cent of sugar, when the syrup is

transferred by gravity to the second tub, situated lower down and similarly constructed. It is boiled slowly in this tub until ready to be transferred to the pans, which are identical in construction with the steam pan of Snavely & Baker.

A system of steam pipes enables steam to be turned into any particular portion of the apparatus as desired, from the first tub to the second tub, and then to the pans. This latter method is preferred. The syrup, on being reduced to the desired point, is drawn off to the receiving tub shown at the left of the plate, and is then ready for market, as the clarification and elimination of the acid is done before the process begins. If the syrup comes into the receiving tub at all cloudy, it is deemed by the makers that carelessness has caused it. The output of this factory is about eight hundred gallons of syrup in twenty-four hours, and while the first cost of constructing it was considerable, the cost of operation is not at all large.

o

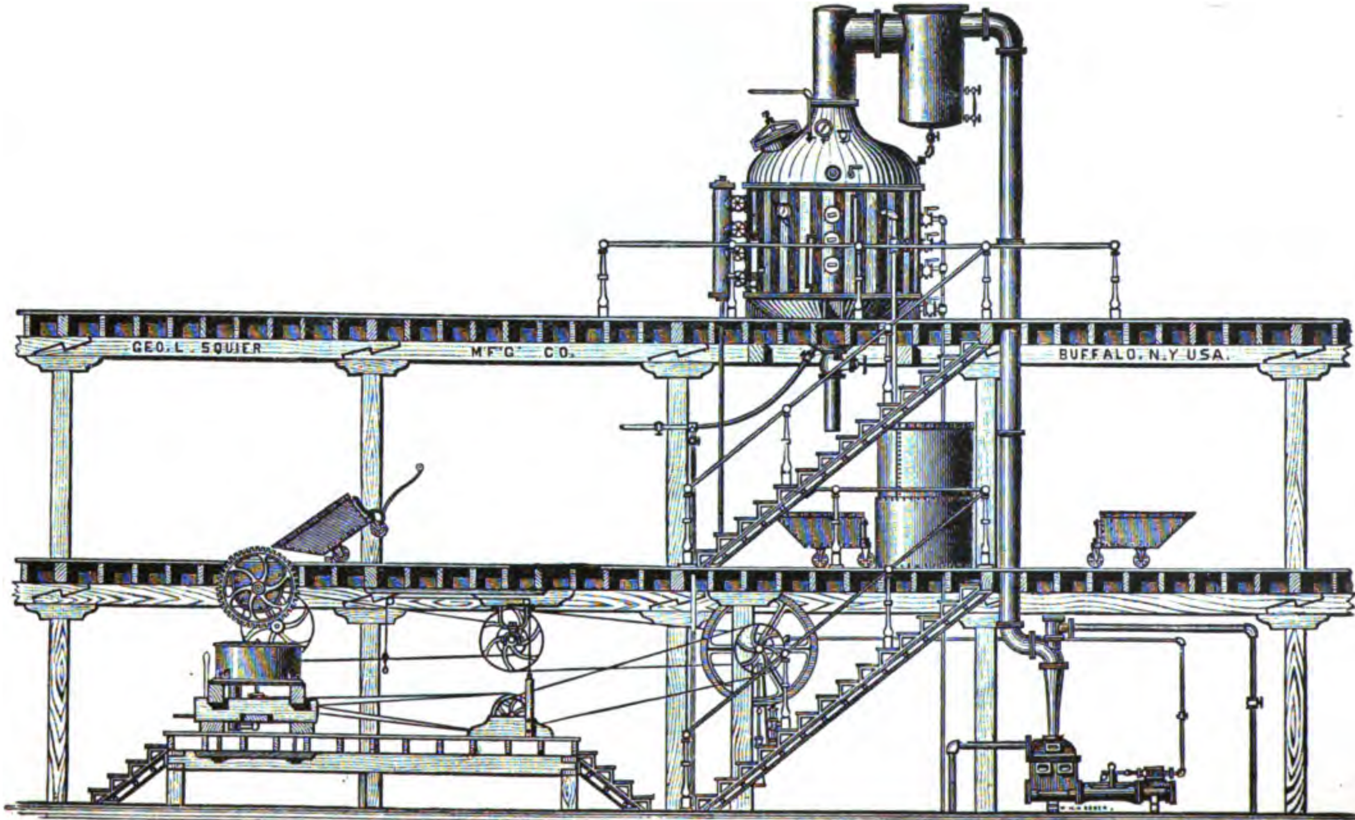


Figure 1.

SINGLE VACUUM PAN FOR REDUCING CANE JUICE TO GRAINING POINT.

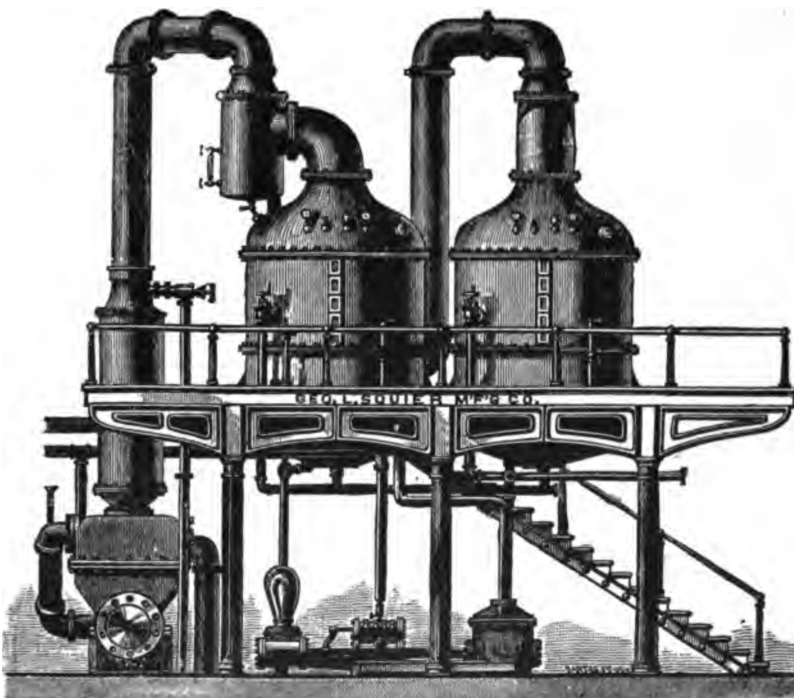


Figure 2.

DOUBLE-EFFECT CONCENTRATOR.

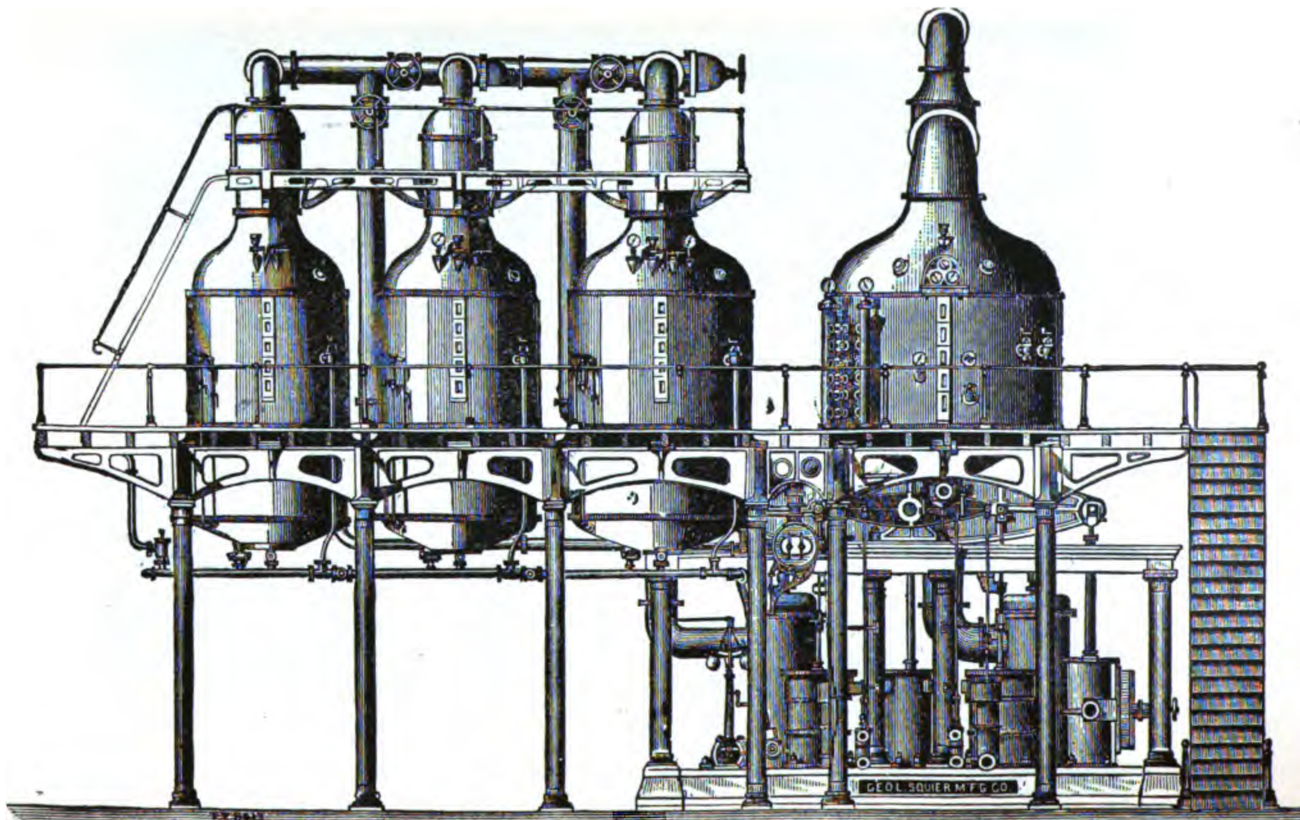


Figure 3.

TRIPLE-EFFECT AND GRAINER.

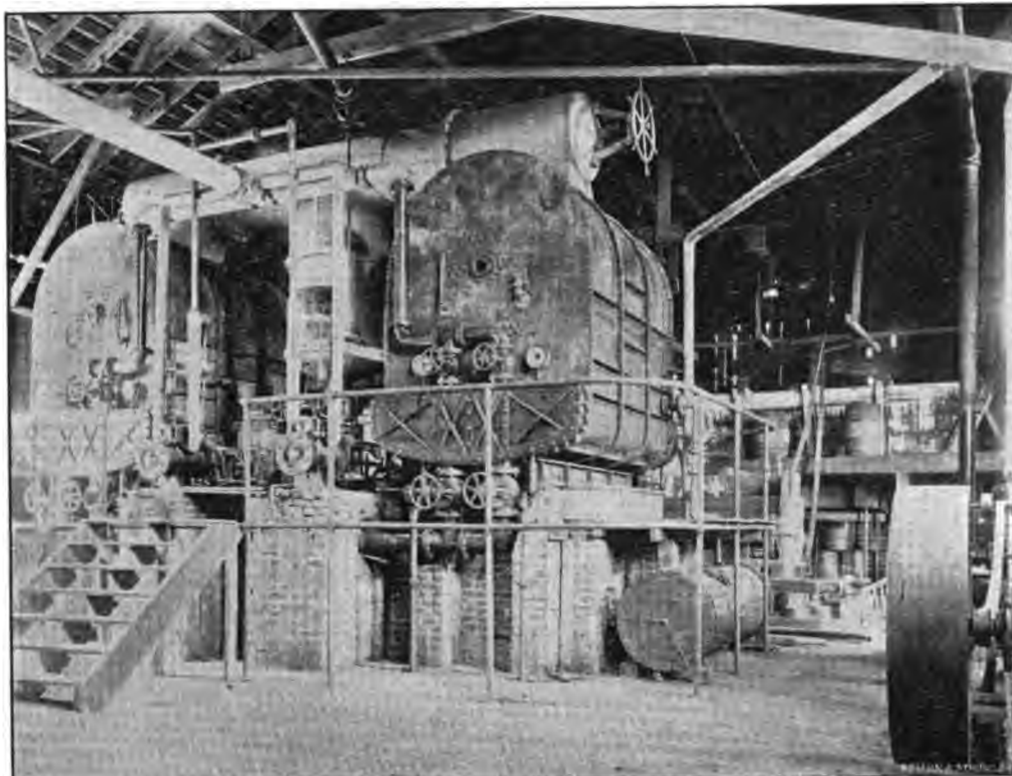


Figure 4.

INTERIOR OF AMERICAN CONCENTRATED MUST CO.'S WORKS, GEYSERVILLE, CAL.

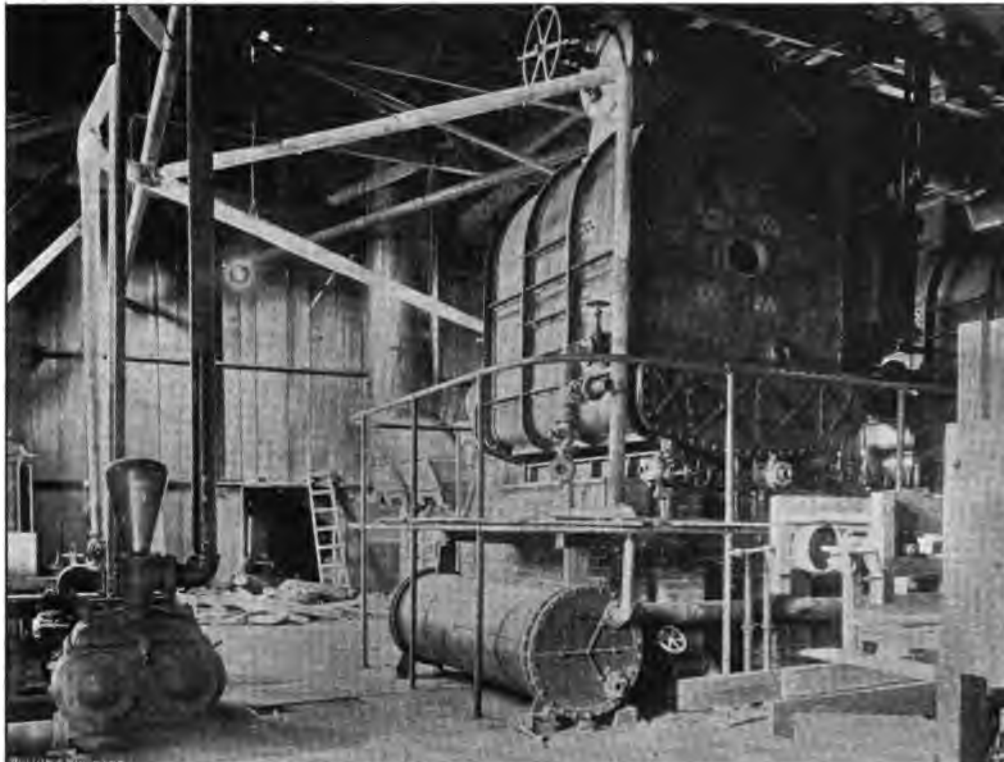
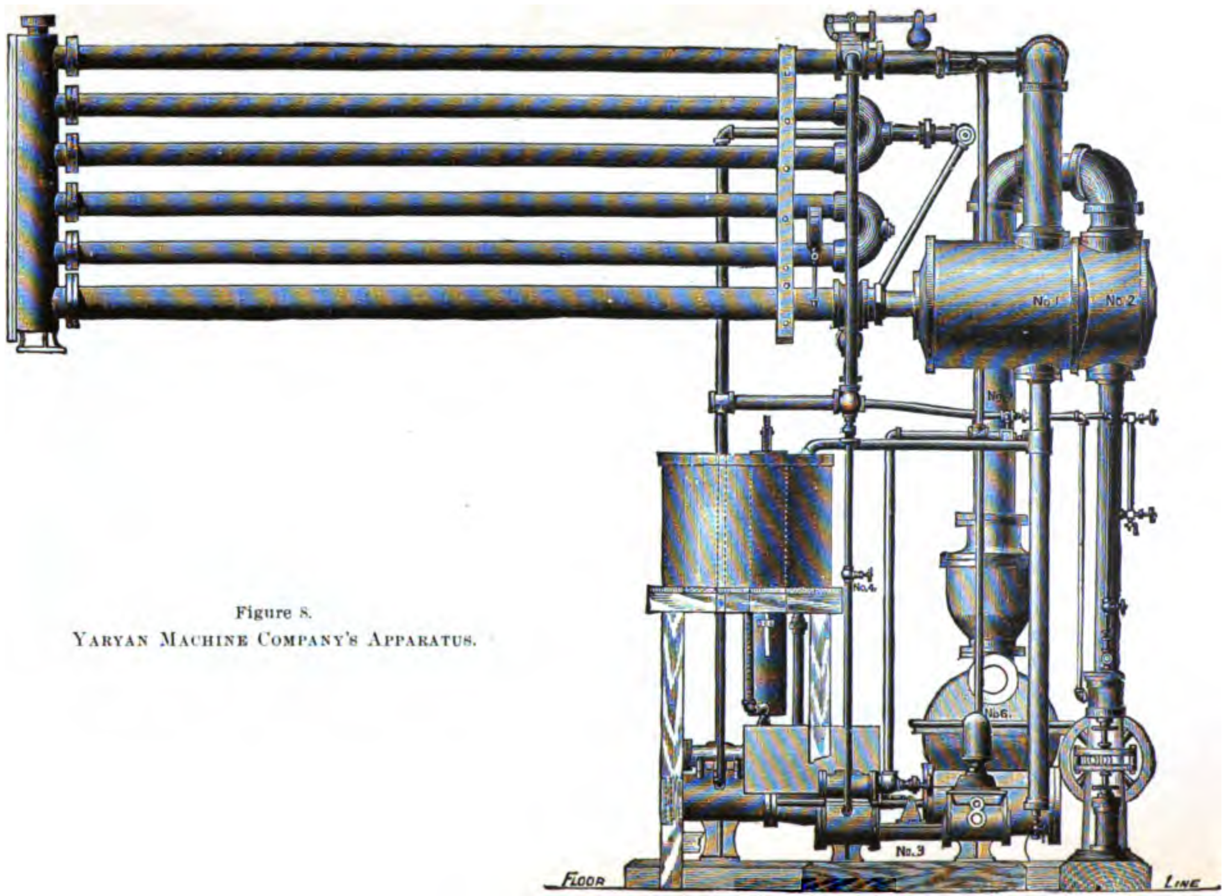


Figure 5.

INTERIOR OF AMERICAN CONCENTRATED MUST CO.'S WORKS, GEYSERVILLE, CAL.



SIDE ELEVATION.

Figure 8.
YARYAN MACHINE COMPANY'S APPARATUS.

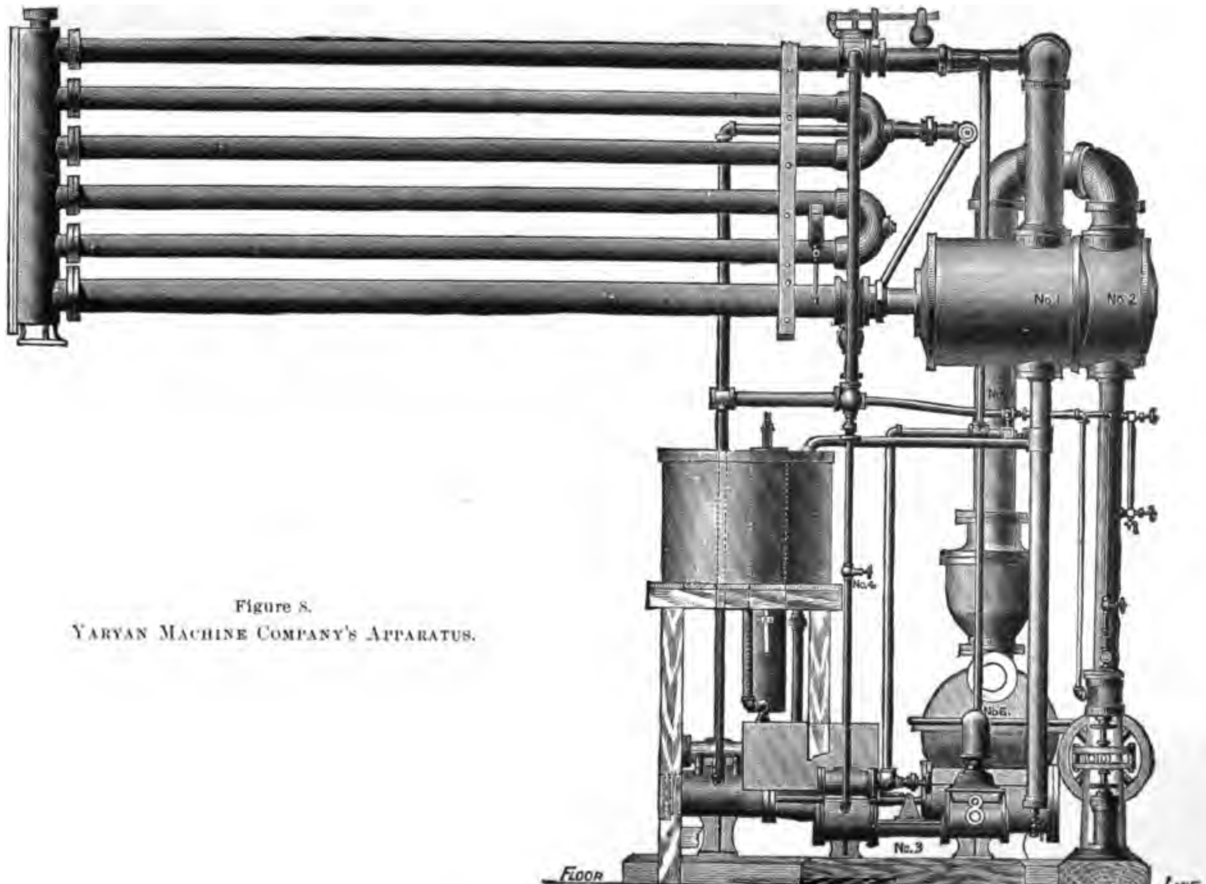


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Figure 8.
YARYAN MACHINE COMPANY'S APPARATUS.

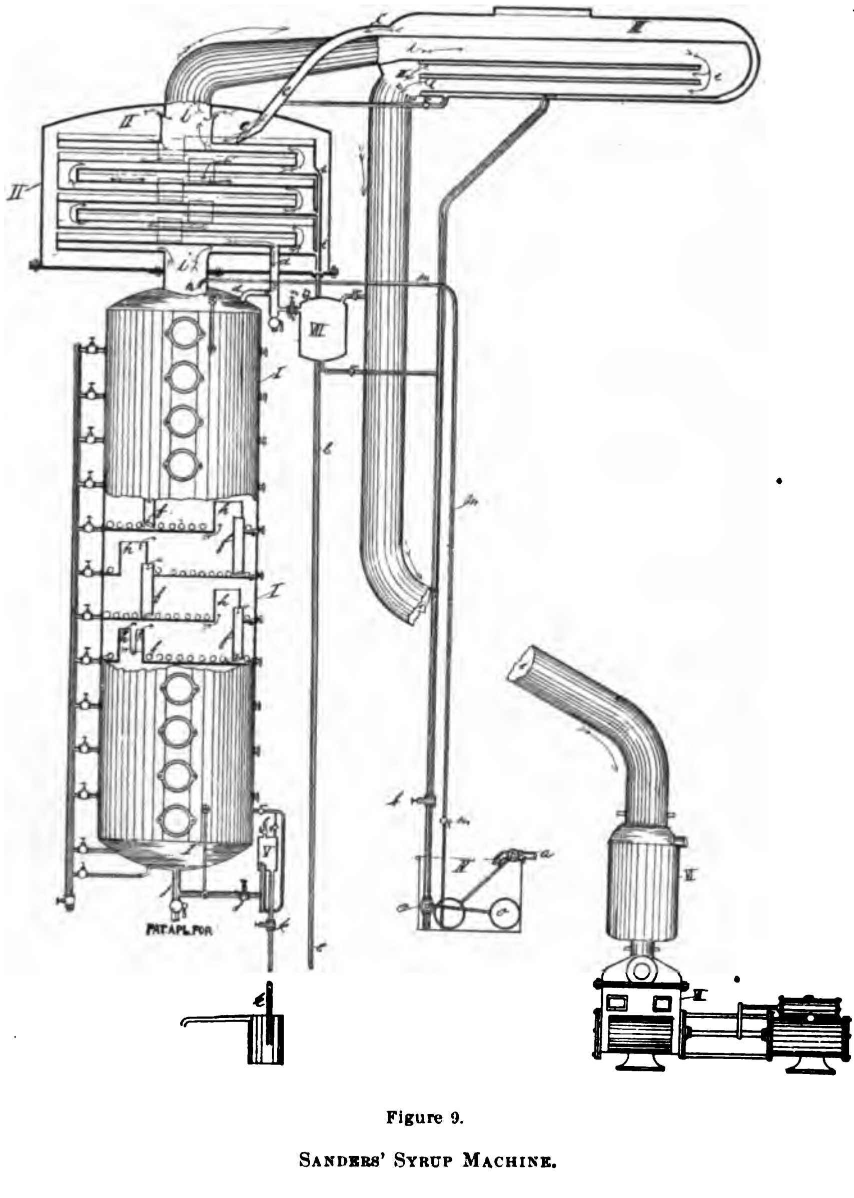

Figure 9.

SANDERS' SYRUP MACHINE.

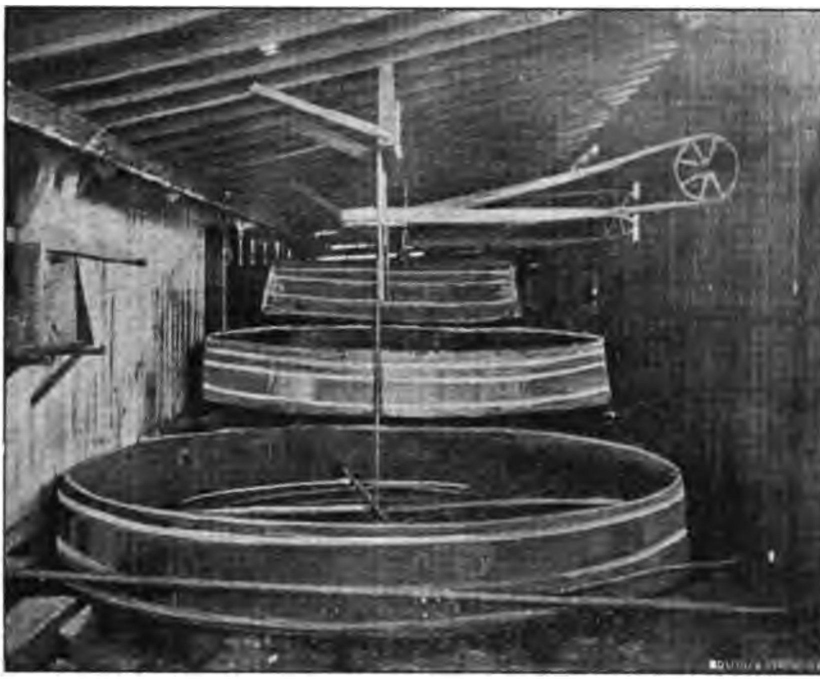

Figure 10.

INTERIOR OF FACTORY OF F. ALBERTZ.

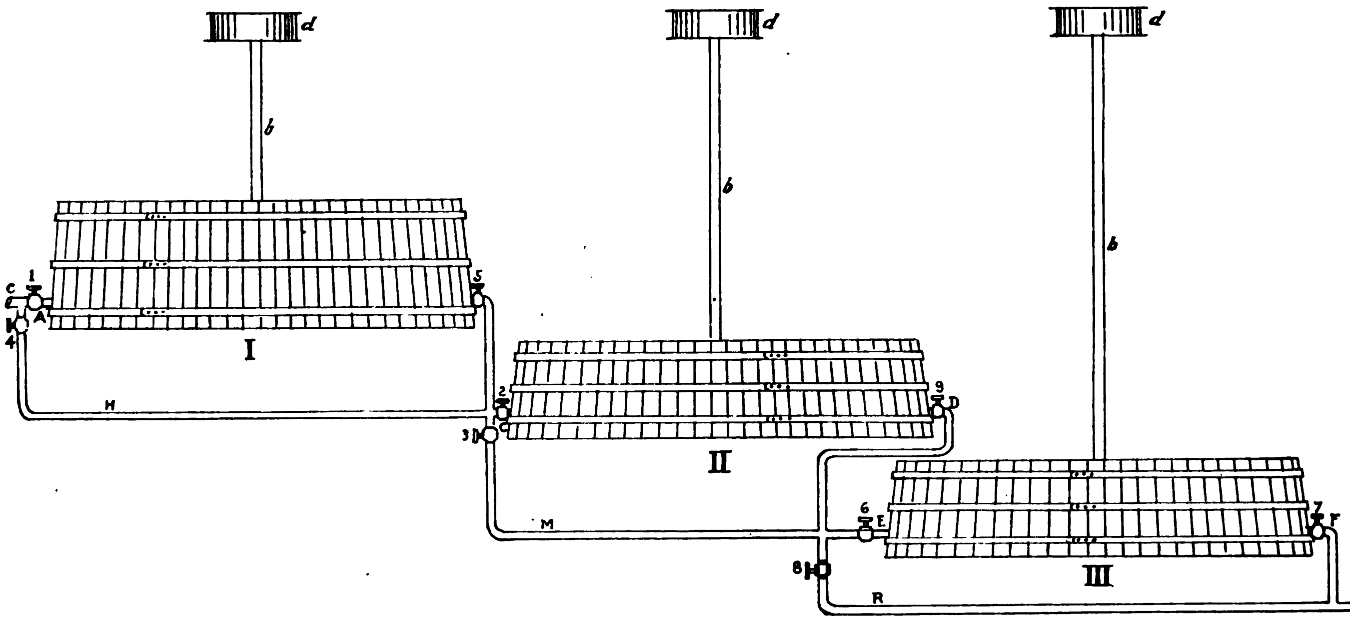

Figure 11.

SIDE ELEVATION F. ALBERTZ'S FACTORY.

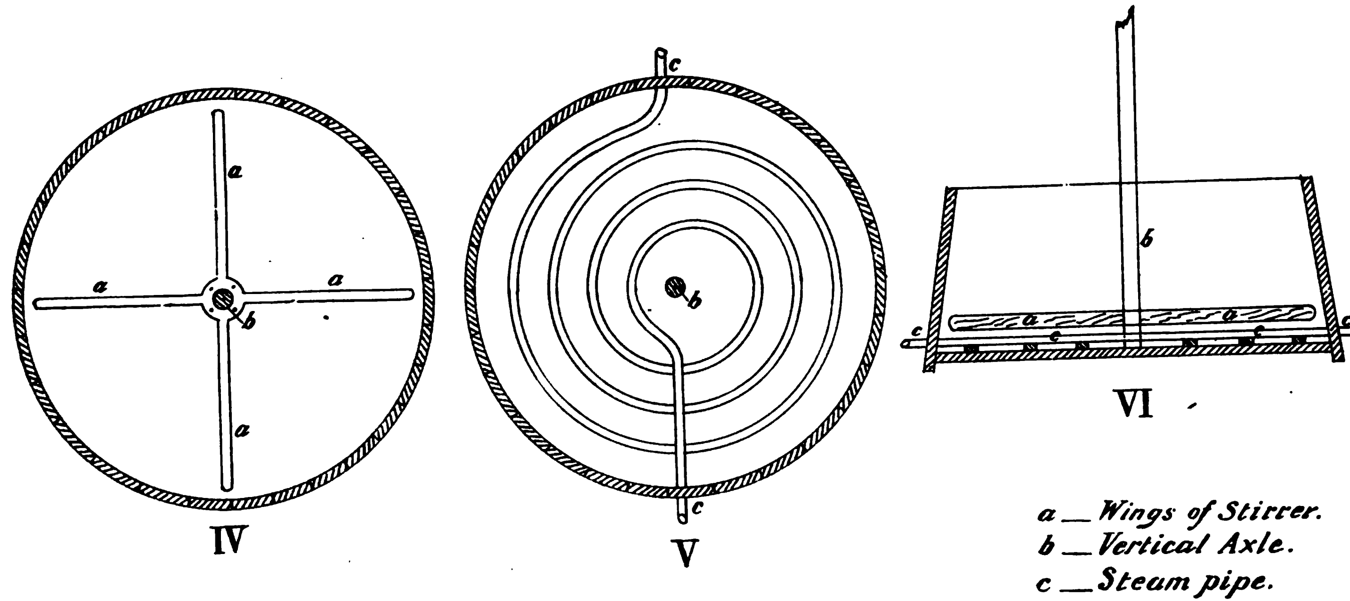

Figure 12.

PLAN AND CROSS-SECTION OF F. ALBERTZ'S WORKS.

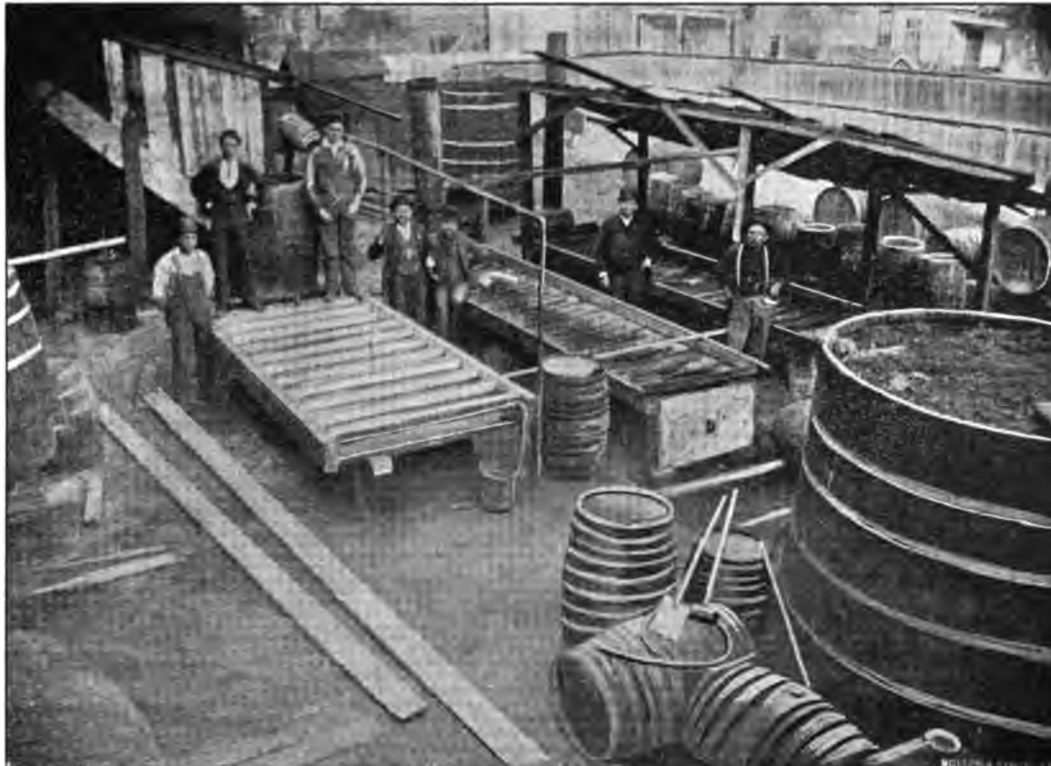

Figure 13.

General View of Snavely & Baker's Works, Woodland, Cal.

Figure 14.

Snavely & Baker's Direct Firing Pan.

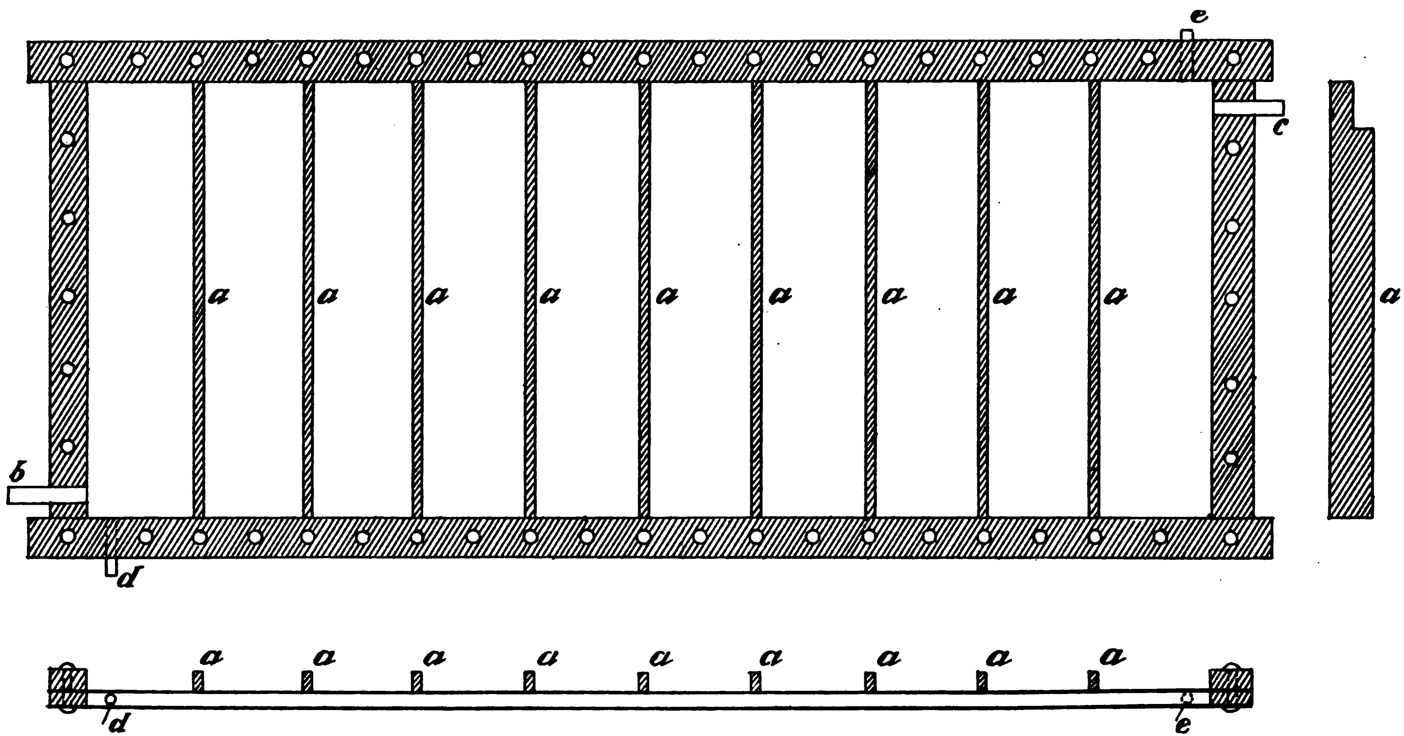

Figure 15.

SNAVELY & BAKER'S STEAM PAN.

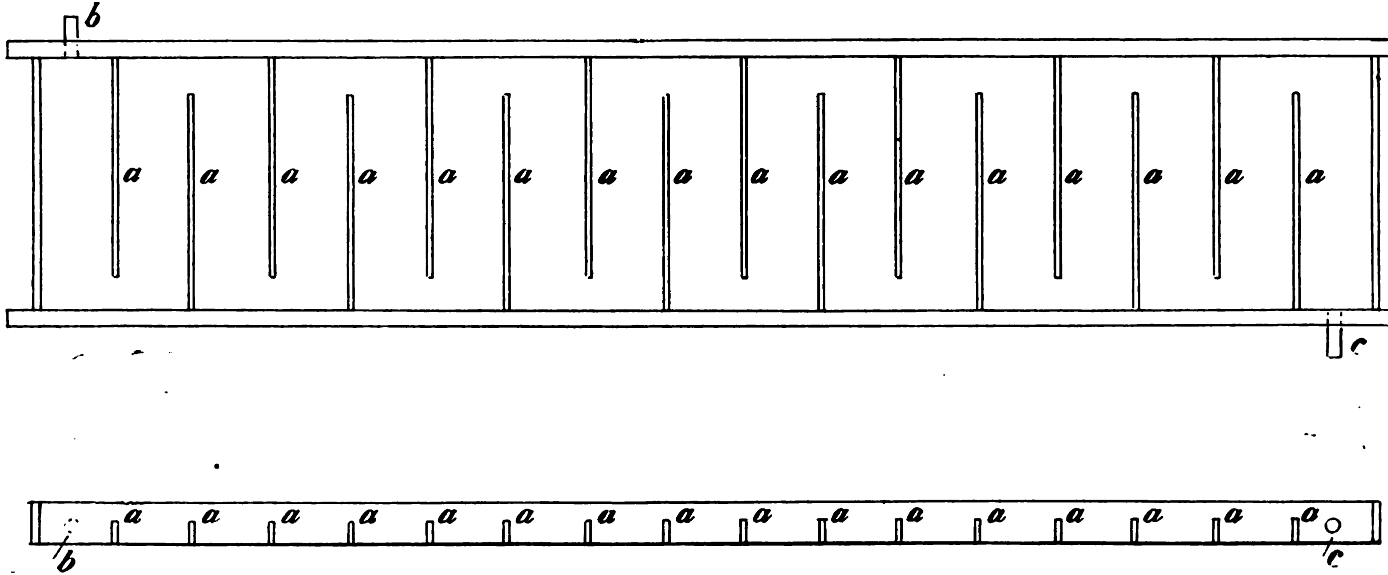

Figure 16.

Snavely & Baker's Direct Firing Pan.

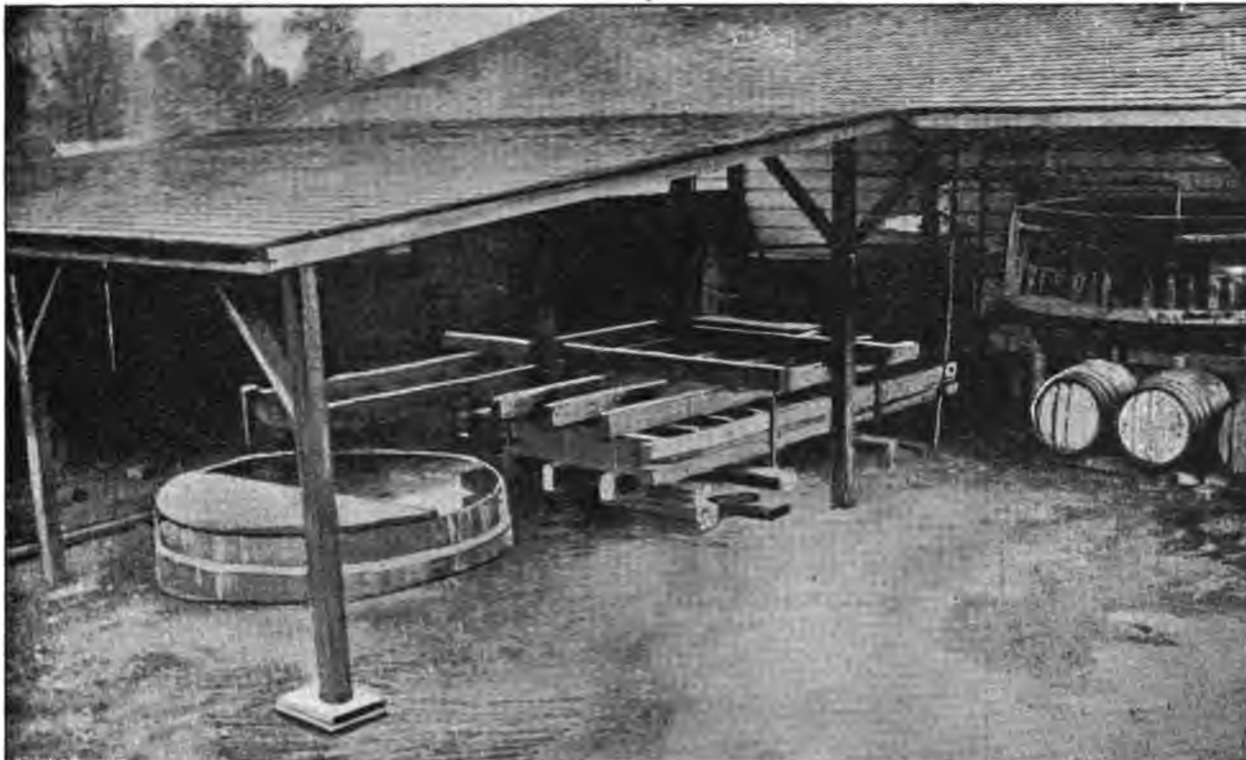

Figure 17.

Yolo Winery's Works, Woodland, Cal.

REPORT

OF THE

Board of State Viticultural Commissioners

FOR 1893-94.

WITH APPENDICES A, B, C, D, E, AND F (A AND B BOUND SEPARATELY).

SACRAMENTO:
STATE OFFICE, : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1894.

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By exchange,

OFFICERS AND MEMBERS OF THE BOARD.

JOHN T. DOYLE, President .... San Francisco.
Commissioner for the State at Large.

E. C. BICHOWSKY, Vice-President .... San Gabriel.
Commissioner for the Los Angeles District.

H. W. CRABB, Treasurer .... Oakville.
Commissioner for the Napa District.

J. DEBARTH SHORB .... San Gabriel.
Commissioner for the State at Large.

GEO. WEST .... Stockton.
Commissioner for the San Joaquin District.

ISAAC DETURK .... Santa Rosa.
Commissioner for the Sonoma District.

ALLEN TOWLE .... Towles.
Commissioner for the El Dorado District.

R. D. STEPHENS .... Sacramento.
Commissioner for the Sacramento District.

CHARLES BUNDSCHU .... San Francisco.
Commissioner for the San Francisco District.

WINFIELD SCOTT, Secretary .... San Francisco.
CLARENCE J. WETMORE, Chief Executive Viticultural and Health Officer .... Livermore and San Francisco.

Office of the Board:
101 SANSOME STREET, SAN FRANCISCO.

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FINANCIAL REPORT OF JOHN T. DOYLE,

President of the Board of State Viticultural Commissioners.

San Francisco, September 1, 1894.

To his Excellency H. H. Markham, *Governor of the State of California:*

Sir: I herewith transmit the financial report of the Board of State Viticultural Commissioners, showing the receipts and disbursements of the Board during the forty-fifth fiscal year.

You will find annexed the financial statement furnished by C. J. Wetmore, Chief Executive Officer.

Respectfully submitted.

JOHN T. DOYLE,
President of the Board of State Viticultural Commissioners.

To the Board of State Viticultural Commissioners:

Gentlemen: I respectfully submit the following report of receipts and expenditures for the forty-fifth fiscal year, and the amount available for the forty-sixth fiscal year.

RECEIPTS.

Amount appropriated by the State Legislature for the use of the State Viticultural Commission for the forty-fifth and forty-sixth fiscal years		$30,000 00

EXPENDITURES.

(Forty-fifth fiscal year.)

Salaries	$3,000 00	
Office expenses, including salaries of employés and rent	4,378 90	
Work outside State (including work done at World's Fair, Chicago, and at Washington, D. C.)	3,174 68	
Statistics	850 00	
State Analyst	55 00	
Traveling expenses of Commissioners	35 60	
Traveling expenses of Chief Executive Officer	153 75	
Library	57 70	
Investigations	74 85	
Distributing information	82 75	
Reports	145 50	
Expressage	94 38	
Midwinter Fair	2,076 00	
		14,179 11
Amount available for forty-sixth fiscal year		$15,820 89

Respectfully submitted.

C. J. WETMORE,
Chief Executive Officer.

REPORT OF JOHN T. DOYLE,

President of the Board of State Viticultural Commissioners.

SAN FRANCISCO, September 12, 1894.

Hon. H. H. MARKHAM, *Governor of California:*

SIR: As President of the State Viticultural Commission, I submit to your Excellency the following report. The reports of the members appointed from the several viticultural districts, which accompany it, may be relied on for all information of a local character, and I shall therefore confine myself to matters of general interest.

Viticulture has, during the biennial period now closing, been much depressed, and at the present writing is probaby at the lowest point ever touched since it was first established in this State. More wine is annually produced than the present market will take, and prices have consequently gone down to a point where production is conducted at a steady loss to the wine farmer. Ordinarily in such cases a remedy would be found in ceasing to plant what can only be produced at a loss; but such a remedy is inapplicable in the case of a vineyard. It is a permanent plantation, representing the labor of five years and considerable pecuniary outlay; and it must either continue to be pruned and cultivated, every season, or be grubbed out at considerable cost per acre; for, neglected, the vines will ere long become so thick and tangled as practically to afforest the land again, besides impoverishing the soil by their rampant growth. The vineyardist is thus remitted to a choice between two alternatives, each of which entails decided loss. Besides this he is embarrassed by the fact that the land best adapted to the growth of grapes is not found suitable to cereals or other annual crops. There are thousands of acres in the district I know best, which give an annual yield of six hundred gallons of wine per acre, but from which it would be difficult to get as much as half a ton of hay. The situation is thus a very sad one, for viticulture is intrinsically an industry of the highest interest to the State (as supporting a denser population than any other branch of agriculture), and it is not too much to say that California is better adapted to it than any other known region of the world. France, Spain, and Italy, the largest European wine producers, are all subject to such frequent and injurious irregularities of weather—storms of rain and hail, unseasonable frosts and blighting siroccos—that, though the vines put on in spring as bountiful a display of blossoms as with us, yet the wine produced does not on the average exceed two hundred gallons to the acre. In California I am convinced that four hundred will be found about the average. In addition to this, the unbroken sunshine of our summers, which brings the whole crop, of each variety in the vineyard, to maturity simultaneously, gives us superior material to work on, so that though we have doubtless much yet to learn as to processes of manufacture, and especially of blending and maturing wines, we are able to produce those we do grow as

cheaply as any European country, and but for our remoteness and other unfavorable conditions could compete successfully with the French in their own markets.

Two years ago, notwithstanding the fact that that market requires a peculiar form of cooperage, not made in the United States (or else a loss of that actually used), our wine growers looked hopefully to France as a market for our surplus; and a single large shipment was successfully made there. Had our Government offered any reciprocal advantage to French products, there is excellent reason to believe that our wines could have secured free entry into France, to the incalculable advantage of our State; and those were the days of reciprocity. But either because there was no one in authority or having its ear, in Washington, who took an interest in the question, or perhaps by reason of difficulties unknown to us, the effort was not made, and a new French tariff, then adopted, put an end to that hope probably forever.

Our wine growers were also sanguine that the great Columbian Exposition at Chicago would afford the occasion for a display of our products which would not fail to bring them to the favorable notice of the civilized world; and great hopes were indulged in on this basis. The State and several of the counties incurred considerable expense to make a creditable display of our varied agricultural and horticultural products. Whatever result of good may have attended these efforts in other departments, it is certain that so far as viticulture is concerned, they were a dismal failure. The difficulty began at the beginning. The distribution of space was first confided to the California Commissioners; after they had undertaken it, the same duty was delegated to Mr. La Rue, chief of viticulture in the Department of Horticulture. No notice of the change was given to the first named gentlemen, and perhaps Mr. La Rue himself was not apprised that there was a change. He, though assiduous enough while seeking the position, was afterwards so engrossed by its duties at Chicago that we saw no more of him in California. Circulars were issued to proposed exhibitors, but the mode of conducting the Exposition, the subdivision and distribution of parts, what belonged to the State's exhibit, to be displayed in its own building, and what to the viticultural department of the horticultural building, was never explained and could not be learned in this State. Most vineyardists supposed we were to contribute to a general exhibit, wherein, while each would retain his portion distinct, the State would obtain credit for the whole, and so asked space enough merely to place his products. Others not so modest—and perhaps better informed—applied for room for a moderate sized store. The whole business being conducted by correspondence with Chicago, what was asked for, conceded, done, or refused was only to be ascertained there, and each one only knew what his own letters brought him. In January, 1893, it was announced that Mr. La Rue had at length returned from Chicago and desired to confer with us at the rooms of this Commission at two o'clock P. M. on a certain day. A large number assembled to meet him, but, having forgotten to bring with him the necessary papers, he was only able to tell us the numbers of the spaces assigned to particular exhibitors, and could not locate them on the ground. It came out, however, that some four or five persons or firms had secured about nine tenths of the whole space, and that the portion awarded to the State at large was scattered about here and there in various places. For want of the necessary information it was impossible

even to suggest any remedy for this absurd state of things, and the whole matter had to be turned over to one of the employés of the California Commission, with instructions to make the best arrangement of the conflicting claims that he could, after seeing the plans and numbers and conferring with the parties interested. Some arrangement he did make, and there was an exhibit. I cannot speak of it from personal observation, but I was not surprised to be told that it was on the whole quite inferior to that of the local Midwinter Fair at San Francisco. The general dissatisfaction and disgust among those who should, and under normal circumstances would have been the exhibitors, was adverse to success.

There were other causes of just dissatisfaction. For some reason—probably the meanness of the congressional appropriation—the Fair managers felt called upon to exercise extreme economy in every department of the management. Monopolies of all kinds were created and sold, and at such high prices as to compel the purchasers (politely termed *concessionaires*) to get the utmost farthing out of them, as a condition of avoiding loss; and however harshly the monopoly worked—even though it tended to defeat the very object of the Exposition—the management could not relax it, having sold and parted with the control. From this arose that extreme parsimony and meanness which pervaded the whole atmosphere of the Exposition, to the infinite disgust of liberal minded persons connected with the management, and of all unconnected with it. By selling, for value, exclusive privileges the managers had tied their own hands and deprived themselves of the power to treat exhibitors with liberality or even with justice. This was forcibly illustrated in our case. The purchasers of the monopoly of catering (including the selling of wine) laid in a stock of wines for the anticipated trade, which they naturally purchased for as little, and proposed to sell for as much, as possible. Of course the goods purported to be European wines. Now a cardinal point in our California exhibit was to show that our State can and does furnish (quality and price both considered) better table wines—giving more value for the money—than any other country. But to this end it would be necessary to exhibit and offer them at their ordinary prices, in equal competition with the foreign articles at theirs. This privilege we were denied. A wine grower was not permitted either to sell or even give away samples of his products, lest doing so might interfere with the profits of the *concessionaire*. By a stretch of courtesy he might permit his wine to be tasted on the spot, but the worthlessness of this privilege is obvious. One fatigued with tramping through the endless aisles, galleries, and corridors of numerous buildings, is in no mood to distinguish shades of quality in wine, and indeed, has no power to do so. If he might carry away a small quantity to be consumed at his meal or at home, the producer might hope to acquaint him with the character of his goods; but this was forbidden.

The exclusive privilege of inscribing a California wine on the wine list of all the restaurants was offered for sale and at one time announced as sold for a large sum. This scandalous abuse was, however, defeated, and a general list of our wines made and printed for distribution in all the restaurants. Still, as the caterer declined to carry them on hand, the advantage of this concession was but slight. Through the efforts, however, of our Chief Viticultural Officer, who was on the spot, the privilege was obtained of having an assortment of our wines kept on sale

at *one* of the many restaurants; but we still remained handicapped, for the grower could not fix the price of his goods, save at rates justly regarded as extortionate. The reason of this was not to be found in the commission of twenty-five per cent on sales reserved by the management, nor in the second commission of thirty-three per cent on the remainder, exacted by the *concessionaire;* for the grower, in order to advertise his goods, might be willing to sacrifice half the amount of his sales; but the *concessionaire's* exclusive privilege stood in the way. California wines at fair, or even moderately high, prices would interfere with the sale of the stock of (presumably genuine) French wines laid in by The Wellington Catering Co., and therefore our prices had to be put up to a forbidding figure; thus willingly or unwillingly we were compelled to demand prices for our goods which either forbid their sale or brought them into ridicule. A wine which in San Francisco sells for $5.50 a case, and is put on the tables of the hotels and restaurants here at 50, 60, or at most 75 cents per bottle, was not *permitted* to be sold for such prices. Under these circumstances, it is evident that the exhibit of our wines could only prove valueless to us. Practically all we were permitted to exhibit was the outside of the bottle! And the authorities of the Exposition frankly acknowledged this ridiculous result, by the announcement that bottles on exhibition need not be filled with wine; water would answer quite as well, and indeed had some advantages, as *not presenting so much temptation to nocturnal prowlers who might pass the night in the building.*

The distribution of awards by the managers of the Exposition was in harmony with this absurd exhibition of our goods. A conference of persons proposing to exhibit was held in San Francisco in January, 1893, and expressed its views with unanimity on two points; on which, indeed, no one possessed of any knowledge on the subject would find room for difference of opinion; they were (1) That the "*one juror* system" favored by Mr. J. Boyd Thacher (chief of that department) could not properly be applied to wine; and (2) That we desired our wines judged by European experts, and especially that no Californian should be placed on the jury. As the departure from this rule led to some subsequent acerbity of feeling, I may be pardoned for a few words in explanation of its reasons.

The wines of all countries have their peculiar characteristics, and persons accustomed to them, and highly qualified to determine the various shades of quality of one sort, may yet be quite incompetent to pass on those of another. A Bordeaux expert, for example, will not undertake to give a judgment on Spanish, Rhenish, or Portuguese wines, nor will experts in those varieties pass upon the wines of Bordeaux. Now our State within its broad domain has soils and climates of infinite variety and produces wines resembling those of nearly every country of Europe, and is the only State in the Union that does so. Our products have nothing in common with the wines grown in the Eastern States, which are not even fermented from the juice of the same fruit, for the *vitis vinifera* cannot tolerate the rigorous winters which prevail east of the Sierra Nevada. Hence, there is no real competition between our wines and those of Missouri, Ohio, Michigan, or New York, and no propriety in appointing persons accustomed to them to appreciate ours. Our wine makers aim higher; they undertake to compete with the wines of Germany, France, and Spain, and even with the superior products

of those countries, and hence naturally demanded the judgment of persons conversant with those wines as to our rank relatively to them. The "one juror system," applied properly enough to exhibits of animals, where all the different points of excellence have their relative values assigned to them, and can be ascertained by measurement or count, is obviously inapplicable to a commodity the merits of which have to be tested by the careful application of the most delicate of the senses educated to the highest point. In such cases no way of judging merit has ever been devised equal to the *consensus* of opinion of skillful experts free from the prejudice liable to be derived from a knowledge of capsules, corks, labels, and other marks of origin. We desired also to shun the judgment of Californians, lest they should be deemed prejudiced in our favor, preferring to challenge criticism rather than to possibly be charged with prevailing by favor. *Fas est et ab hoste doceri.*

These views of the California exhibitors were made known to the authorities of the Exposition and secured some attention from them; but one of the Commissioners then in office—himself an exhibitor—either differing from, or forgetting the deliberate judgment of his *confreres*, being in Chicago, urged upon those in authority there, the *right* of California to *representation* on the wine jury! We are so accustomed to the idea of representing different interests on our political committees and on other public occasions, that this suggestion was favorably received; and probably on the same principle other States were accorded the like right. Learning by private telegram that his suggestion had been adopted, the Commissioner in question lost no time in nominating a candidate for the position, whose appointment was at once made, and announced by the press on the following morning. The gentleman thus nominated set off without delay for the scene of his labors. This performance, as soon as known, gave rise to great dissatisfaction among the wine growers, as may be readily understood. Whatever confidence might have been reposed in Mr. Pacheco's impartiality, had he been selected independently, was destroyed by the fact that he was named by one of the exhibitors. The situation was in no way mended by the choice of the other members of the jury. Two Spanish Commissioners were appointed to judge the wines of Spain, and those of Portugal were treated in the same way. France indignantly withdrew her exhibit, and, had authority for the purpose existed, California would doubtless have done the same. The other jurors were Americans selected from various States, as Missouri, Ohio, Illinois, Kentucky, etc., and the only one among them generally known as an expert in wines, naturally declined to serve. All this was evidently intended to class our wines with those of Missouri, Ohio, New York, etc., and pointed so clearly to a coming judgment of the wines of each State, by the juror from that State and representing it, as to lead to a general expression of indignation and disgust from those interested; for it was quite absurd and precisely the reverse in every respect of what we had demanded. The universal expression of dissatisfaction, both by the exhibitors and the press, prevented the consummation of the "one juror" outrage, and the expedient of the gentlemen who did act silenced individual complaint, for they, with magnificent impartiality, gave awards to *all* the exhibitors whose wines arrived in marketable condition, so that no one could complain that his merits had been overlooked. This was not, however, what was looked for from the great Columbian Exposition.

In order that the money and effort spent in our exhibit might not be wholly without fruit, this Commission, voicing the wishes of the viticulturists of the State, dispatched one of our former members to Chicago, who was successful in inducing the representative of the British Government to appoint a competent expert in the wines sold in the London market, to examine and present to him for the use of his government, a critical report on the California wines exhibited. This duty was discharged with great care by Mr. C. F. Oldham, the gentleman selected, and his report, forming part of the general report of the English Commissioners to the Exposition, can hardly fail to attract attention abroad. It has in fact been made public in England, and while discriminating between products of different individuals and localities, is on the whole highly laudatory of California viticulture.

During the summer just past, an effort was made to secure better prices for wine by the organization of a syndicate to control the bulk of the crop; and offers of the capital needed for the purpose encouraged an effort to that end. For this purpose options to buy the growing crop, at prices materially above those prevailing last year, were with considerable effort and the expenditure of a small sum of money secured from the great mass of growers, covering perhaps eighty per cent of the total crop of the State. When accepted by the syndicate to which they were to be transferred, they were to be molded into contracts, for the present and succeeding years up to and including 1898, at gradually advancing prices, which would have given the growers some moderate return for their capital and labor. When the options had been collected, however, instead of treating with those whose offers had originally incited the effort, overtures to the like effect from large wine dealers of San Francisco were listened to, and the result, as might have been foreseen, was that after much negotiation, differences arose as to the exact terms of the proposed contracts, which were discovered to be insuperable only when it had become too late to shift front; and the whole project fell through. I hoped to be able to chronicle the success of this movement in the present report, but am denied that satisfaction. It is to be hoped that between this time and the vintage of 1895 some such arrangement will be made, and the industry of which the State is so justly proud may be rescued from its present prostrate condition.

It is to be regretted that the numerous and respectable body of citizens who devote themselves so earnestly to the eradication of the vice of drunkenness, have never turned their attention to the advantages of California wine as a promoter of temperance. It is abundantly proved by statistics, and indeed, is the common observation of travelers, that the nations in which the daily beverage of the people is light wine are conspicuously temperate ones. Intoxication, so common in all countries of the north of Europe, and unfortunately in our own country, too, is extremely rare in southern Europe, where wine is the ordinary beverage of the inhabitants. It is stated, too, by standard writers, that chemists now recognize some twenty-five or thirty different varieties of alcohol, distilled from different sorts of vegetable substances, differing very slightly in chemical composition, all efficient as intoxicants, but widely different in their hygienic effects. Of all these the alcohol distilled from wine is the most adapted to medicinal use, and the least injurious under any circumstances. On the other hand, that produced from the potato is in every sense the worst; the intoxication

resulting from it is accompanied by quarrelsomeness and violence, and the use of it generates that *alcoholic thirst* which is the prolific parent of so much crime and misery. Now, universal experience proves that mankind will have and use some sort of stimulant; the Asiatic nations, from the earliest dawn of civilization, used wine. It is referred to in the most ancient records of the human race. The savages of the interior of Africa, and those of this continent, as well as of the many islands which dot the ocean, have all found the means of procuring alcohol from plants of different sorts. It is worthy of remark that the nations which took the lead in civilization, so far as history shows, and the conquering races, both of ancient and modern times, were the wine-drinking peoples; the Greeks and the Romans in ancient times and the French in mediæval and modern days. The degeneracy which some perceive in their descendants in our own day, and the increase of intoxication among them, are ascribable to the introduction of German *potato alcohol*, which is lately finding its way all over the south of Europe as the basis of various compounds, such as vermouth and other cordials. I am persuaded that if the advocates of temperance, enforced or encouraged by law, would direct their efforts to a discrimination in the license law, in favor of our native wines carrying a low percentage of alcohol, and otherwise encourage the consumption of them, they would be rewarded by a sensible diminution of intoxication, and that within a very short time. I have myself managed and controlled a large vineyard for the last fourteen years, during all but a portion of the first year of which, the laborers have all been from southern Europe and their customary daily beverage, wine. They drink it at their meals and carry it afield with them when at work, and during the whole period we have not had a single case of intoxication on the place.

STATISTICAL.

The statistics of the movement of wine and brandy from California points have been kept by the Commission with the usual care. The Secretary has made it a point to attend to these details personally.

The receipts of wine and brandy at San Francisco have been as follows:

RECEIPTS OF WINE AND BRANDY AT SAN FRANCISCO FROM THE INTERIOR.

Year.	Wine—Gallons.	Brandy—Gallons.
1892	9,474,353	636,060
1893	11,836,750	693,059

Turning now to the question of exports, the details for the years 1892 and 1893 are as follows:

TOTAL WINE SHIPMENTS.

Year.	By Sea.		By Rail Overland.		Grand Total.		Total Value.	Average Price per Gallon.
	Cases.	Gallons.	Cases.	Gallons.	Cases.	Gallons.		
1892	15,876	4,843,128	36,948	6,330,624	52,824	11,117,752	$5,016,158	$0 44 6/11*
1893	13,344	3,704,834	37,702	8,621,199	51,046	12,326,033	5,355,093	43 *

* Estimating 2½ gallons to the case in the totals.

TOTAL BRANDY SHIPMENTS.

Year.	By Sea.		By Rail Overland.		Grand Total.		Total Value.	Average Price per Gallon.
	Cases.	Gallons.	Cases.	Gallons.	Cases.	Gallons.		
1892	667	539,957	2,554	366,763	3,221	906,720	$1,297,396	$1 41⅞*
1893	832	292,434	1,766	495,908	2,098	788,342	1,188,557	1 50 nearly.*

* Estimating 2½ gallons to the case in the totals.

In order to compare the exports of wines to different points for the two years, the following tables have been prepared, taking up the statistics from the point left by my predecessor, Hon. J. DeBarth Shorb:

SHIPMENTS OF WINE BY SEA.

Year.	Cases.	Bulk Gallons.	Value.
To New York—			
1892	2,848	4,331,802	$1,983,306
1893	1,079	3,134,969	1,458,331
To Central America—			
1892	9,496	90,325	107,864
1893	9,562	94,711	98,407
To Mexico—			
1892	1,156	82,571	50,222
1893	471	86,729	39,980
To Hawaii—			
1892	743	113,239	81,465
1893	726	140,338	84,331
To British Columbia—			
1892	517	18,392	11,073
1893	493	18,099	11,120
To Japan and China—			
1892	378	42,149	17,544
1893	444	38,897	17,407
To Great Britain—			
1892	174	72,843	32,621
1893	54	63,542	27,415
To Germany—			
1892	216	58,119	26,780
1893	107	15,226	8,824
To Other European Countries—			
1892	10	12,038	4,684
1893	10	15,776	4,463
To Tahiti—			
1892	1	16,105	5,526
1893	1	38,638	9,284
To All Other Foreign Countries—			
1892	337	5,545	5,036
1893	397	7,909	5,844

The shipments of brandy, by sea, to various ports in the two years named have been as follows:

SHIPMENTS OF BRANDY BY SEA.

Year.	Cases.	Bulk Gallons.	Value.
To Domestic Eastern Ports—			
1892	46	290,864	$525,870
1893	10	190,766	351,227
To Germany—			
1892	3	131,375	111,708
1893		61,068	51,465
To Great Britain—			
1892	10	109,028	70,306
1893		31,011	27,669
To All Other Foreign Ports—			
1892	608	8,690	13,820
1893	322	9,579	12,236

DETAILS OF OVERLAND SHIPMENTS.

The details of overland shipments for the two years 1892 and 1893 will be found annexed. They will bear careful study.

WINE AND BRANDY OVERLAND, FOR THE YEAR 1892.

To—	Wine.		Brandy.	
	Cases.	Gallons.	Cases.	Gallons.
Boston	269	13,254		750
Providence	12	275		
Other New England points	613	18,902	7	683
Buffalo	146	9,942		578
New York	5,347	614,998	24	51,461
Rochester		5,586		
Other New York points	409	9,242	19	448
Philadelphia	612	12,512	8	1,197
Pittsburg	554	380,204	82	238
Other Pennsylvania points	678	20,450	14	1,129
Washington	142	29,674	7	1,204
Baltimore	89	757	1	
Other West Virginia, Virginia, and Maryland points	110	1,184	34	
Charleston, S. C.	13	134		
Atlanta	5	922		10
Savannah	500	115		
Other Carolina and Georgia points	179	473	2	
Birmingham	20	11,893		
Mobile	224	28,661		111
Pensacola		5,635		
Other Eastern Gulf States	251	13,846	39	1,101
New Orleans	668	2,857,444	34	1,742
Donaldsville		7,623		
Baton Rouge		2,355		
Plaquemine		9,250		
Other Louisiana points	149	33,718	18	594
Dallas	215	16,875		755
Fort Worth	49	18,532	3	
Austin	25	2,006		
Galveston	703	100,042	19	1,822
Houston	336	18,916		716
San Antonio	557	36,136	39	3,066
Waco	1	2,215		

WINE AND BRANDY OVERLAND, FOR THE YEAR 1892—Continued.

To—	Wine.		Brandy.	
	Cases.	Gallons.	Cases.	Gallons.
Other Texas points	842	35,460	72	2,708
Hot Springs		521	1	
Little Rock	7	1,851		184
Other Arkansas and Indian Territory points	114	1,114	10	5
Memphis	14	22,851		1,036
Chattanooga		92		
Louisville	20	48,042		1,390
Other Tennessee and Kentucky points	110	4,839	10	
Cincinnati	594	147,863	4	11,585
Cleveland	145	6,589	3	833
Toledo	199	16,051	2	123
Other Ohio points	213	13,238	38	828
Indianapolis	68	17,461		1,558
Other Indiana points	142	6,996	24	178
Chicago	3,676	881,420	156	102,399
Rock Island	60	3,606		1,070
Other Illinois points	244	32,551	45	3,817
Detroit	57	14,688	2	693
Grand Rapids		3,365		
Other Michigan points	172	15,834	18	1,215
Milwaukee	137	113,562	13	24,938
Other Wisconsin points	260	12,297	26	1,403
St. Louis	831	263,557	12	23,043
Kansas City	956	80,540	14	7,489
St. Joseph	143	17,855		5,015
Other Missouri points	112	1,235	13	264
Council Bluffs	28	17,844		112
Dubuque	21	4,964		621
Sioux City	61	2,030	4	1,350
Davenport	1	5,825	1	
Other Iowa points	283	10,317	35	4,432
St. Paul	470	100,593	4	16,085
Minneapolis	203	53,121		9,222
St. Cloud		4,765		
Other Minnesota points	137	17,729	4	1,345
Omaha	457	34,484	31	10,848
Atchison		82		
Topeka	1	14		
Other Kansas and Nebraska points	653	21,323	23	3,237
Dakotas	136	12,921	6	1,814
Denver	3,315	108,991	71	12,421
Pueblo	723	16,484	28	2,501
Other Colorado points	2,837	76,116	752	14,160
New Mexico	1,061	32,375	199	4,064
Utah	2,022	40,778	337	13,991
Montana and Idaho	2,182	106,432	268	15,762
Foreign	171	32,623	18	196
Totals	36,948	6,330,624	2,554	366,763

WINE AND BRANDY OVERLAND, FOR THE YEAR 1892—Continued.

From—	Wine.		Brandy.	
	Cases.	Gallons.	Cases.	Gallons.
San Francisco	25,519	4,335,210	1,921	236,735
Oakland	772	13,177	30	1,531
Alameda	7	30		
Pleasanton	4	12,452		392
Livermore	144	32,217	3	487
Irvington	896	56,075		15
Warm Springs	4	1,149		
Menlo Park	23	25,257		
Mountain View	20	10,024		
Santa Clara	9	18,856		48
San José	1,484	104,412	406	5,074
Los Gatos	431	7,629	7	250
Gilroy		36		
Boulder Creek		209		
Santa Cruz	122	6,958	5	135
Martinez	12	1,266		
Concord		22,996	5	15
Antioch		96		
Cornwall		95		
Lathrop		26		
Stockton	231	41,906	2	612
Ione		969		40
Oakdale	1	291		
Lodi	2			
Sacramento	371	83,633	17	1,250
McConnell		3,060		
Elk Grove		7,250		
Folsom		5,131		2,143
Diamond	1			
Rocklin		94		
Loomis		42		
Colfax		139		
Placerville		525		
Woodland		6,160		10
Davisville				44
Gridley		23		
Oroville		648		
Marysville	19	1,120	1	1,973
Vina	66	20,110	17	53,646
Redding	1	10		
Suisun		56		
Elmira		26		
Cordelia	26	9,716		2,000
South Vallejo	4			
Napa	112	148,275	2	5,508
Yountville		592		
Oakville	6	552,439		1,070
Rutherford	14	12,740		25
Larkmead	12			
Bano		5,050		50
Bale		27		
Krug	20	9,230	7	1,079
Bello		21		
St. Helena	196	107,190	8	12,715
Calistoga	22	7,873		
Sonoma		123		
Sobre Vista		2,215		
Glen Ellen	1	13,956		267
El Verano		4,881		25
Yulupa		3,145		
South Los Guilicos		10,148		
Vineyard		58,387		1,789
Santa Rosa	61	72,404	1	2,416
Neville		177		10
Sebastopol	3	443		10
Fulton		2,352		
Korbels	730	25,279		965

WINE AND BRANDY OVERLAND, FOR THE YEAR 1892—Continued.

From—	Wine. Cases.	Wine. Gallons.	Brandy. Cases.	Brandy. Gallons.
Geyserville		17,802		
Healdsburg	1	19,981		223
Asti		7,405		2,280
Cloverdale		497		250
Ukiah	88	412		32
Fresno	50	148,774		2,547
Fowler		26		
Traver		27		
Bakersfield		10		
Los Angeles	5,345	123,749	115	10,540
San Gabriel	81	74,267	2	14,785
Glendale		2,000		172
Guasti		17,853		311
Downey		8,107		247
Savanna	3			
Fernando		20		
Santa Ana	2	1,343	4	499
Pomona		26,067		
Norwalk		16,192		174
San Pedro		300		56
Winthrop	10	1,364	1	141
Anaheim	1	9,664		1,180
Cucamonga		8,707		
Colton		12,771		75
Redlands		36		5
Brookside		12,000		
San Bernardino		9,750		
Santa Paula		53		
Santa Barbara	28	1,294		
Portland				127
Totals	36,948	6,330,624	2,554	366,763

WINE AND BRANDY OVERLAND, FOR THE YEAR 1893.

To—	Brandy. Cases.	Brandy. Gallons.	Wine. Cases.	Wine. Gallons.
Boston	2	44	628	15,596
Other New England points	16	207	523	21,392
Buffalo		315	123	11,033
New York	23	111,919	6,330	3,439,509
Other New York points	2	3,282	861	49,338
Philadelphia	4	143	481	32,528
Pittsburg	4	1,746	216	38,479
Other Pennsylvania points	11	1,165	365	16,118
Baltimore			85	736
Washington	1	1,234	91	38,247
Other W. Va., Va., and Maryland points	2	120	55	2,819
Charleston			8	33
Wilmington				175
Atlanta			12	2,180
Savannah				3,215
Other Carolina and Georgia points	2	25	197	5,001
Baton Rouge			2	7,174
New Orleans	16	3,739	671	3,089,216
Other Louisiana points	6	363	134	111,825
Birmingham			1	11,902
Mobile		91	215	29,125
Plaquemine			3	19,337
Montgomery			117	1,928

WINE AND BRANDY OVERLAND, FOR THE YEAR 1893—Continued.

To—	Brandy.		Wine.	
	Cases.	Gallons.	Cases.	Gallons.
Other Eastern Gulf States	22	571	292	32,711
Galveston	12	3,804	864	98,821
Houston	4	36	143	10,022
San Antonio	8	1,719	354	44,010
Austin	....	201	10	3,623
Dallas	3	347	543	21,085
Fort Worth	12	198	154	3,969
Other Texas points	123	2,634	902	34,918
Hot Springs	....	46	2	375
Memphis	....	347	3	12,489
Little Rock	....	....	22	62
Other Arkansas and Indian Ty. points	....	24	99	1,278
Louisville	23	223	103	52,201
Other Tennessee and Kentucky points	....	190	58	8,393
Cincinnati	1	8,306	749	143,558
Columbus	....	....	....	2,563
Cleveland	....	423	84	23,687
Toledo	....	699	30	14,211
Other Ohio points	13	244	224	8,437
Indianapolis	....	399	60	16,486
Other Indiana points	1	127	66	16,391
Peoria	....	....	....	6,483
Rock Island	....	335	12	1,975
Chicago	281	106,360	9,590	830,075
Other Illinois points	5	4,241	327	32,920
Other Michigan points	5	1,089	372	35,947
Milwaukee	27	25,561	491	120,467
Other Wisconsin points	2	543	89	9,003
St. Louis	1	263	481	328,548
St. Joseph	8	1,393	171	8,910
Kansas City	4	10,581	810	81,658
Other Missouri points	....	92	56	1,931
Davenport	....	1,127	....	3,759
Dubuque	....	767	22	15,012
Council Bluffs	....	1,407	....	5,040
Sioux City	....	1,121	6	41
Other Iowa points	3	1,749	341	15,902
Minneapolis	2	9,813	216	32,118
St. Paul	63	10,347	272	62,621
Other Minnesota points	5	2,266	64	12,644
Lincoln	....	1,360	11	1,096
Atchison	....	1,220	....	1,880
Omaha	11	12,613	377	38,087
Other Kansas and Nebraska points	21	1,820	383	15,597
Dakotas	11	2,070	363	10,291
Denver	150	8,876	2,394	87,669
Pueblo	8	512	204	9,387
Other Colorado points	414	8,292	1,631	80,361
Montana and Idaho	113	8,449	1,281	62,227
Utah	193	6,882	1,047	28,631
Albuquerque	107	4,717	701	23,890
Mexico	10	553	95	29,545
Bremen, Germany	....	25	4	44,625
Holland	....	....	....	2,459
England	....	....	18	21,269
Belgium	....	....	1	7,712
Other foreign points	....	14	12	14,558
Totals	1,766	495,908	37,702	8,621,199

WINE AND BRANDY OVERLAND, FOR THE YEAR 1893—Continued.

From—	Brandy.		Wine.	
	Cases.	Gallons.	Cases.	Gallons.
San Francisco	1,285	277,072	29,225	5,581,621
Oakland	10	139	89	3,556
Alameda			3	201
Pleasanton		5	21	5,305
Martinez				709
Livermore	19	73	81	45,463
Concord		652	15	30,625
Stockton	10	10,676	200	57,825
Marysville	3	186	20	1,999
Vina	108	67,904	176	15,537
Sacramento	11	10,932	201	68,515
Fresno		23,715	33	182,868
Lincoln				181
Chico				171
San José	219	5,548	1,103	204,012
Warm Springs			45	10,515
Menlo Park			3	12,545
Mountain View		14	17	59,671
Redwood		4	28	273
Irvington		55	610	51,544
Los Gatos			39	14,147
Gilroy				10,764
Mayfield			3	
Oroville			25	1,081
Madrone				397
Hollister			1	172
West's Spur		10,460		53,688
Sierra Vista		2,160		4,635
Antioch				66
Cornwall				381
Oakdale				461
Modesto				48
Bakersfield				2
Santa Clara				8,008
Santa Cruz	12	399	31	5,832
Elk Grove		25		4,638
Hermitage				11
Napa	4	10,706	87	539,478
Oakville		1,033	16	271,462
Yountville		5	34	562
Rutherford		44		9,915
Ukiah				479
Routier				45
El Verano				473
Bello				114,795
Yulupa				20,990
Vineland		219	2	74,173
St. Helena		14,529	222	18,831
Krug	1	605	27	9,169
Dixon				15
Woodland				149
South Vallejo		33	2	65
Larkmead		7	14	
Glen Ellen		900	26	7,747
Shellville		25		5,682
Sobre Vista				2,522
Drummond				4,665
Elmira				50
Calistoga			23	16,970
Cordelia		240	25	9,673
Cloverdale			2	2,913
Vineyard		1,379		82,616
Geyserville				9,775
Chiquita		200		13,460
Guerneville				35
Trenton				96
Los Guilicos		2,422		5,080

WINE AND BRANDY OVERLAND, FOR THE YEAR 1893—Continued.

From—	Brandy.		Wine.	
	Cases.	Gallons.	Cases.	Gallons.
Sonoma		243		2,481
Annadel		10		2,555
Windsor				5,045
Santa Rosa	1	3,060	12	91,130
Asti		778	61	21,548
Korbels		3,172	177	31,913
Petaluma				10
Colfax				47
Healdsburg	4	40		16,725
Ione		15		1,662
Folsom		90		2,396
Natoma				17,508
Brighton				27
Placerville		10		268
Latrobe				30
Diamond				26
Rocklin				91
Auburn		31		85
Cucamonga				169
Downey		213		536
Newark				2,570
Alhambra		23		
Anaheim		180		2,626
West Glendale				15,682
Colton				40
Los Angeles	73	7,874	4,054	122,105
Sunny Slope		1,223		12,980
Shorb				2,923
Guasti		50		4,695
San Gabriel	2	5,955	76	58,455
Ontario				52
Pomona				30,433
San Buenaventura				159
Santa Ana	2	279	2	661
Wilmington				220
Winthorp	1	119	16	1,318
Santa Barbara		15	25	1,552
Totals	1,766	495,908	37,702	8,621,199

IMPORTS OF FOREIGN LIQUORS.

In this connection it will be found interesting to compare these figures with the statistics of imports of foreign wines and brandies at San Francisco. These will be found below:

IMPORTS OF STILL WINES IN CASKS.

Year.	Gallons.	Value.
1892	54,733	$38,659
1893	51,276	34,955

IMPORTS OF STILL WINES IN BOTTLES.

Year.	Dozens.	Value.
1892	16,910	$70,684
1893	22,888	89,209

IMPORTS OF CHAMPAGNES AND ALL SPARKLING WINES.

Year.	Dozens.	Value.
1892	19,486	$312,503
1893	16,963	257,435

IMPORTS OF BRANDY.

Year.	Proof Gallons.	Value.
1892	15,003	$39,312
1893	11,519	32,985

Respectfully submitted.

JOHN T. DOYLE,
President.

PROGRESS REPORTS OF CLARENCE J. WETMORE, CHIEF EXECUTIVE OFFICER.

FIRST REPORT.

Read at the meeting of the Board held December 12, 1892.

SAN FRANCISCO, December 12, 1892.

To the Board of State Viticultural Commissioners.

GENTLEMEN: Acting under the direction of your Executive Committee, I have taken steps to establish four experimental plots for the purpose of testing the resistant properties of the different so-called resistant vines. One of these plots will be located at Oakville, Napa County, in H. W. Crabb's vineyard; one in I. De Turk's vineyard, South Los Guilicos, Sonoma County; one in W. B. West's vineyard, Stockton, San Joaquin County, and the other in Santa Clara County, the location not determined as yet. In these plots I will plant the following varieties of American vines: Solonis, Riparia, Lenoir, Rupestris, York-Madeira, Cunningham, Cyntheana, Noah, Cinerea, Champini, and four hybrids that I have ordered from France that are reported to be perfectly resistant. Some of these varieties I cannot obtain the rooted vines, and have therefore had to procure cuttings. The cuttings will be planted carefully in the plots, and enough of them put in nursery to take the place, the next year, of those that do not grow. In a year's time I will be able to report on the growth made by the different varieties. The resistant properties of the varieties cannot be determined for several years.

The demand for Riparia vines is very great this year, and there are practically none to be had in the State. The suggestion offered by Commissioner Priber, some time ago, that this Commission take some steps to raise these vines and sell them to vineyardists at actual cost, should be acted upon at this meeting. A carload of Riparia cuttings could be obtained from Nebraska at a moderate cost, and arrangements could be made to have them rooted. I know of no nurseryman who intends to root Riparia cuttings in large quantities, and in order that the demand for these vines might be satisfied it will be necessary for the Commission to act in the matter. We have sufficient funds now to make the experiment, and it could be made without costing the State a cent.

Yours, respectfully,

CLARENCE J. WETMORE,
Chief Executive Officer.

SECOND REPORT.

Read at the meeting of the Board held December 11, 1893.

SAN FRANCISCO, December 11, 1893.

To the Board of State Viticultural Commissioners:

GENTLEMEN: During the past six months I have visited most of the vine-growing sections of the State for the purpose of determining the condition of the grape crop of 1893, and also to observe the progress made by the different vine diseases. In almost every district the grapes were found to be in excellent condition. There was no damage from frost in the spring, with the possible exception of a few low-lying vineyards in Sonoma County. The temperature during the summer months was comparatively low and the grapes were not injured by the sun. In some places, where the vines were not well sulphured, oidiun did some damage, but the loss in the aggregate was small. The early fall rains did some damage to the grapes in Napa and Sonoma Counties, but those in the other counties escaped injury. When the grapes were ripe they were in better condition than I have ever seen them before, and a large proportion of the wine made this year should be of fine quality.

The phylloxera is still spreading and new spots are constantly being discovered. I have had a great many vines sent to me, during the past six months, for examination, and on nearly all of them I have found the phylloxera. The demand for resistant vines continues good, but the supply in the State does not equal the demand. I know of one party who has this year sent to Missouri for 500,000 Riparia cuttings for planting in his vineyard in Sonoma County. The Riparia is still the favorite variety, and in fact, hardly any other is planted, simply for the reason that our knowledge of the other resistant varieties is very limited. The establishment of our experimental plots may throw more light on this subject in the future. Unfortunately the late spring rains retarded the planting of the vines and cuttings in the plots, and a good stand was not secured. Most of the vines are growing, but only a few of the cuttings took root. I will fill out the plots, as far as I can, with vines rooted at my vineyard. In studying the different varieties at the nursery on my place, I found that of the cuttings planted more of the Solonis took root than of any of the others. Fully ninety-five per cent of Solonis cuttings grew. The Rupestris came next; then Champini. Very few of the Berlandieri or Cinerea took root. I have great hopes that the Solonis will prove resistant in the different portions of the State. In France M. Gos informed me that it was very resistant in calcareous soils. The chief points of merit are: (1) Roots easily from cuttings; (2) Is a strong and vigorous grower.

Of the hybrids that I imported from France I cannot at present report definitely upon. So far the Alicante Bouschet Rupestris seems to be the strongest grower.

Southern Vine Disease.—In company with Commissioner Bichowsky, I examined the vineyards in Los Angeles County for the purpose of determining the progress of the Anaheim disease. At the time I was there (the latter part of July), the disease did not show itself very much, and the foliage was extremely healthy. Some vines that were abandoned a few years ago, but not pulled up, bore this year a good crop of

grapes. A few vines showed the disease, which proved that the disease had not disappeared. If the proper conditions present themselves again, the vines may suffer as they did a few years ago. During August and September I learned from Commissioner Bichowsky that the disease showed itself in a more marked degree. I examined the vines in the L. J. Rose Co.'s vineyard to see if there was any phylloxera, but did not find any. Around Santa Ana and Orange the young Muscat vineyards are doing well, but the disease has appeared among them; at present it does not seem to destroy the vines. The small vineyard near Santa Ana in which the phylloxera was found the past year, has been rooted up. A few suckers came up this year from the roots left in the ground and so kept the roots alive, and on these roots the phylloxera still lives. The County Commissioner will now apply bisulphide of carbon, and so treat the ground that all of the roots will be killed. The danger of spreading the disease from this vineyard is very small, as there are no other vineyards near it.

The nature of the exhibit that this Commission will make at the Midwinter Fair should be determined upon at this meeting. The Executive Committee have agreed to spend about $2,000 on an exhibit, and have agreed to place it in the collective exhibit. Some plan should be adopted so that all bills for the exhibit will be readily allowed by the State Board of Examiners.

Respectfully,

C. J. WETMORE,
Chief Executive Officer.

THIRD REPORT.

Read at the meeting of the Board held June 11, 1894.

SAN FRANCISCO, June 11, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: During the past year I have visited most of the vine-growing sections of the State for the purpose of determining the progress made by the phylloxera and the "southern vine disease," and I am now able to make the following report:

Southern Vine Disease.—In July, 1893, in company with Commissioner E. C. Bichowsky and Professor Ethelbert Dowlen, I made a thorough examination of the vines in the San Gabriel Valley. The vines were found to be in a very healthy condition, much more so than for several years past. Some few signs of the Anaheim disease were observed, but there were but few vines found to be dying. Several patches of vines that had been abandoned a few years ago, as destroyed by the disease, were this year throwing out good strong canes, and were well loaded with fruit. In the L. J. Rose Company's vineyard a great many young vines had been planted, which showed no signs of the disease, and were making a good growth. In the vicinity of Anaheim and Santa Ana the disease was found among some of the two and three-year-old Muscat vines. From what I could see and learn the disease still exists in the vineyards of Southern California, but the effects of the disease are not as severe as they used to be. If the proper conditions present themselves again, the disease will no doubt again become epidemic.

Phylloxera.—The damage done to vines by the ravages of phylloxera is no longer confined to Napa and Sonoma Counties, for the vines in all the bay counties are now more or less affected. The amount of damage done so far in Alameda, Santa Clara, and San Mateo Counties is not very great, but the phylloxera having now obtained a foothold in these counties, many thousands of acres will be destroyed during the next five or six years. A few resistant vines are being planted, but the total amount is not very great. As no new vineyards are being planted, the phylloxera will be the cause of a great decrease in the output of wine during the next few years.

The grape crop of 1893 was an exceptionally large one. All of the climatic conditions during the year were favorable to the development of the vine and fruit. There were no frosts, coulure, or mildew to cut off any of the crop, and the heat of the sun was at no time severe enough to do any damage to the grapes. The grapes ripened perfectly, and, generally speaking, good wines were made. In some localities a deficiency of sugar in the grapes was noted, and also a lack of color in some wines. Generally speaking, however, the wines of 1893 have given good satisfaction.

As near as can be estimated, the amount of wine produced in the State in 1893 was as follows:

Dry wines	17,000,000 gallons.
Sweet wines	4,000,000 gallons.
Total	21,000,000 gallons.

Besides this wine, at least 2,000,000 gallons of brandy were made, representing an equivalent of 10,000,000 gallons of wine, so that if all the grapes had been turned into wine the output would have been in the neighborhood of 31,000,000 gallons, or about 400 gallons for every acre of wine grapes planted.

Crop of 1894.—At the present time it is impossible to make an accurate estimate of the coming crop, but every one concedes that it will be much less than that of 1893. The frosts of April and May did considerable damage to the vines in Napa, Sonoma, Alameda, Santa Clara, and Fresno Counties, reducing the crop at least twenty per cent. Where the grapes are far enough advanced considerable coulure is noticed, and the loss from this cause may prove very great. From all appearances the Cabernet grapes will suffer very much from coulure, and there will be a short crop of those grapes. As every one is hoping for a short crop this year, no doubt they will all be satisfied.

Condition of the Wine Market.—Every one interested in any branch of the viticultural industry knows that the present condition of affairs, if continued long, will mean ruin to a great many people. In former years, during a depression in the business, the merchants would be making money at the expense of the producers, or vice versa; but at the present time the business is being run at a loss to both producers and merchants. Some claim that it is overproduction that causes the depression, while others think it is due to competition of some of the wine dealers. No matter what the cause may be, the most deplorable state of affairs exists, and something should be done to bring about a change.

A meeting of the wine makers of the State was called by our Secretary for June first, and at this meeting there was present representative wine

men from nearly all the viticultural districts. Resolutions offered by our President, Mr. John T. Doyle, were unanimously adopted. These resolutions stated the necessity of some action being taken to relieve the present depressed condition, the establishment of cafés in some of the principal Eastern cities, and the appointment of a committee of seven to suggest plans of action; this committee to confer with this Commission for financial assistance and support. The committee appointed at that meeting was P. C. Rossi, for Sonoma County; F. Beringer, for Napa County; F. A. West, for San Joaquin and Fresno Counties; John Swett, for Contra Costa County; E. C. Bichowsky, for Los Angeles County; Wm. Wehner, for Santa Clara County, and C. J. Wetmore, for Alameda County. This committee has had several meetings, and has finally agreed upon a plan that will bring relief at once and place the industry on a paying basis for the next five years, provided the plan outlined is supported by the grape growers and wine makers of the State. This committee now asks the financial support of this Commission, and I would recommend that such assistance should be given them. Action should be taken upon this matter at this meeting.

Permanent Exhibits in Eastern Cities.—The new Executive Committee appointed for the ensuing year should take immediate steps toward carrying out the recommendation of our President, Mr. John T. Doyle, relative to the establishment of permanent exhibits and cafés in some of the Eastern cities. To establish exhibits and cafés under the direct charge of this Commission would cost more money than we could afford to spend out of our present appropriation. I think, however, that some plan could be worked out so that the expense would come within our means. In conversation with Governor H. H. Markham a short time ago, I found that he was of the opinion that the main object now of this Commission should be to help producers obtain a market for their goods, and he was heartily in favor of establishing permanent exhibits in the East. Some plan of this kind might be adopted. Permanent exhibits might be established in one or two of the Eastern cities, where all of the different brands of wine and brandy could be shown. The right of selling the wines could be given to some responsible party, who would have to make terms with the different exhibitors as to commissions, etc. This would relieve the Commission of any responsibility. All this Commission would have to do would be to pay rent and to put the exhibits in place. The expense of this would not be over $300 a month, and could be easily borne by this Commission.

Experimental Plot.—During the past year I have had planted in the experimental plot in Commissioner Crabb's vineyard, at Oakville, Napa County, the following vines, received from Denison, Texas, for the purpose of testing their resistant properties, and also to determine if the fruit from any of them would prove valuable enough to propagate: Brilliant, Early Wine, Rommel, America, R. W. Munson, Delicious, Big Extra, Bailey, Carman, Hermann Jaegèr, W. B. Munsòn, Onderdonk, Black Herbemont, Newnan, Admirable, Mrs. Munson, Perry Muench, Hopkins, Gold Coin, Vinita, Neva Munson, Fern Munson, Ragan, Marguerite, Triumph, Excelsior, Moore's Diamond, and Duchess. These vines are all growing well, and in a few years' time some definite results may be obtained from them. The hybrids received from France a year ago are doing well, and show some fruit this year. If they resist the phylloxera they will be of great value, for being direct producers, there

will be no expense of grafting. Mr. Crabb will save the wood from these vines and graft other vines with them.

State Fair.—Recognizing the importance of the viticultural industry, the State Agricultural Society has made a separate department for viticulture, under the supervision of the State Viticultural Commission, and I have consented to act as superintendent of that department. As a great many cash premiums will be awarded at that fair, I would advise as many wine makers as possible to make exhibits.

Work at Washington, D. C.—Good work has been done, and is still being done, by our representative, Mr. Chas. A. Wetmore, at Washington, D. C., in behalf of the viticultural industry. The tariff on wines has been so amended that it is now perfectly satisfactory to all interested. The amendments to the internal revenue regulations, allowing the bottling of brandies in bond and the blending of brandies in bond, are now being urged by Mr. Wetmore, with the chances in favor of their being adopted. This work at Washington has been one of the principal efforts of this Commission during the past year, and will result in great good to the industry.

C. J. WETMORE,
Chief Executive Officer.

REPORTS OF COMMISSIONERS—1894.

REPORT OF H. W. CRABB,

Commissioner for the Napa District.

OAKVILLE, CAL., June 12, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: It would give me great pleasure indeed to be able to state that the vines in Napa County were as healthy and vigorous as they were ten years ago, and that the crops they produced would command $25 per ton at the wineries, as they did in 1884. But ever since then the price has steadily declined, till they only brought $8 per ton in 1893, with the prospect of not bringing more than that in 1894. This condition of prices will compel people to uproot their vineyards and cultivate the land to other crops. The principal causes are overproduction, mismanagement, and the great financial depression that has lowered the prices of almost everything below the cost of production. Considering that wine is a luxury—not a necessity—the industry is not suffering more than some others; as soon as times are better, it will be one of the first to revive, and those who have resistant vineyards will in the near future get profitable returns. In a few years, if people stop planting, there will be only left in the county the 1,500 acres of resistants now planted. Fully one half of the vineyards between Rutherford Station and the bay have been destroyed by the phylloxera. Those still remaining are more or less infested. The great destruction in this section was owing to overproduction, caused by long pruning. Vines cannot, for any great length of time, remain healthy and vigorous with the annual production of from six to twelve tons of fruit to the acre. The vineyards in the central portion of the valley are not infested to any great extent, and those in the upper end of the valley are almost entirely exempt. There are about 1,500 acres planted to resistant vines; only about one half of those are grafted. The Riparia is considered the best, is easily rooted, and unites readily in grafting; the Rupestris suckers too badly; the Berlandieri is even more difficult to root than the Lenoir; the Solonis is equal, if not superior, to the Riparia; the Lenoir is often sunburnt, so that it can only be grafted below the surface. The resisting power of the Lenoir, as compared with the Riparia and Solonis, is as 13 is to 20.

I am propagating a vine discovered by Mr. Rampandahl in the head of a cañon in the mountains. Its appearance indicates that it is a true Riparia, and of gigantic growth, being more than twice as large as the Riparia, striking roots as readily as any *vinifera*. I grafted them late, yet some of them have made canes half an inch in diameter and five feet long. I have no doubt that it is resistant, and that it will be a valuable acquisition.

The imported hybrid vines I planted last year for the Commission are growing finely, and showing considerable fruit. The thirty-five

varieties of resistant hybrids imported by the Commission this year were also planted in their experimental plot, and are making a fine growth. I expect that some of these varieties will be of inestimable value to the State, as the expense of grafting will not have to be incurred. The new vineyards will contain only the best approved varieties—the harsh Zinfandel will then be a thing of the past, and California wines will attain a world-wide reputation.

The number of gallons of wine returned to the Assessor for 1893 amounted to 3,500,000. The returns for 1894 will approximate 4,000,000. At present there is more wine in the county than there was at this time last year. The quantity of brandy in the St. Helena bonded warehouse on May 31, 1893, was 62,348 gallons; on May 31, 1894, was 75,787 gallons.

Collector Waverley Stairley, of the Fourth District of California, informs me that there were produced in Napa County for 1893, 122,044 gallons of sweet wines and 152,832 gallons of brandy.

The quality of the wines is steadily improving with the experience of the wine makers. The growers and producers must form unions before they can dictate prices. They need not expect that the merchants will join them, for their interest is to buy as cheaply as possible, and then undersell the producer, to prevent his becoming a competitor.

The late frost in May was not general, but still did considerable damage to the crop. It is too early to state what will be the *extent* of the crop.

SOLANO COUNTY.

Here the industry is much more varied than in Napa or Contra Costa. It virtually supplies the San Francisco market with table grapes during the earlier part of the season. It not only furnishes the first grapes for the Eastern market, but the shipments are continued during the season. The grapes are well ripened, of the finest quality, and stand transportation equal to any. The crop from hundreds of acres is cured for raisins, which are but little inferior to the best Fresno article. The grapes are picked and laid out on wooden trays between the rows, to cure in the sun. Hundreds of tons of wine grapes are shipped annually to the wineries at Sacramento and Napa. The remainder of the crop is worked up into wine and brandy at the local wineries.

The Cordelia Wine Co., in addition to their dry and sweet wines, manufacture a superior article of sherry, by the use of solar heat. It is entirely free from the caramel taste as developed by the use of fire heat or steam, where the wine is sweet, and the temperature carried too high and kept in the oven too long. A dry wine under the same circumstances will not acquire it. I believe it was a great mistake in the sweet wine law requiring four per cent of sugar, as a much more delicate article would be produced with only one, or possibly two, per cent. The wines are fortified to 22 per cent alcoholic strength, and placed in a thoroughly tight room with a glass roof, in which the temperature averages about 100°. In cold weather and when the days are cloudy, the temperature is maintained by the aid of a stove. It requires about one year's time to produce a good article.

The phylloxera has in some sections destroyed a good many vineyards, while in others it has not made its appearance.

Collector Waverly Stairley, of the Fourth District, informs me that

the production of sweet wine and brandy in Solano County in 1893 was as follows: Sweet wine, 76,178 gallons; brandy, 21,910 gallons.

CONTRA COSTA COUNTY.

This county contains a large area of the finest vineyard land in the State. The vineyards are in a very healthy and flourishing condition. I could not ascertain that any of them were infested with the phylloxera. But very few vines have been planted for the last three or four years. The products of the vineyards about Clayton are manufactured into wines and brandies. The vineyards in the Alhambra Valley are mostly table varieties, and are shipped to Eastern cities and San Francisco. A large portion of the remainder of the wine grapes are sold to the Italian gardeners in San Francisco and elsewhere, for wine purposes. There are only a few varieties in the county, and the number of gallons reported to the Assessors in 1892 was 184,000; in 1893, 175,000, and in 1894 will approximate 200,000 gallons. On account of the convenience of shipping, and at low rates of freight, growers were enabled to obtain from $10 to $14 per ton for the wine grapes sold to the Italians in San Francisco and elsewhere.

Respectfully submitted.

H. W. CRABB,
Commissioner for the Napa District.

REPORT OF GEORGE WEST,

Commissioner for the San Joaquin District.

STOCKTON, September 7, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: There is little of interest to report concerning the grape-growing industry in the San Joaquin Valley. Both the wine and raisin growers are confronted by depressed general conditions of trade and an overproduction of material.

The production of raisins increased to nearly 85,000,000 pounds in 1893, according to the best obtainable estimates, and the crop of 1894 will not vary materially from this figure. This is nearly, if not quite, double the production of 1890. This output would have been much greater but for the practical elimination of the second-crop Muscats from the raisin crop. Very large quantities of these second-crop grapes have been made into sweet wines and brandy, and are responsible in a great measure for the present demoralized condition of the wine market. It is safe to say that more than 10,000 tons of second-crop Muscats were used in wine making, and half as many in brandy making. This represents a large percentage of the entire wine output of the State and cuts a most important figure in the wine business of to-day. There is practically no limit to the amount of these second-crop grapes obtainable in the San Joaquin Valley, and as price and not quality regulates the American wine market, all branches of grape growing will feel the ill effect of this evil for some time to come. The price of grape brandy

will be regulated by the cost of making brandy from second-crop Muscats. Sweet Muscat wine will largely replace Angelica, Angelica grapes will be made into port, and port grapes into dry wines.

While I believe it will take some time for these conditions to regulate themselves, there has been practically no planting for several years, and I think that sooner or later production and consumption will equalize. Many vineyards are being abandoned, many are being uprooted, and many are dying from disease.

Had it not been for the diversion of the second-crop Muscats from raisin to wine making, the raisin markets would have been flooded with low-grade products, while the wine market would have been in a much better condition.

It was hoped at one time that an outlet for a considerable quantity of Muscats would be found in syrup made from grape must, but nothing seems to have been done in the matter.

From experiments made last year it was proved that grapes when fed to hogs would pay from $6 to $8 per ton. If such is the case practically, it would seem that large quantities could be used in this way.

It is to be hoped that a revival of trade will relieve the present distress among all California grape growers, and that a few years will see the business on a paying basis once more.

Respectfully submitted.

GEORGE WEST,
Commissioner for the San Joaquin District.

REPORT OF E. C. BICHOWSKY,

Commissioner for the Los Angeles District.

SAN GABRIEL, August 18, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith submit the following biennial report as Commissioner for the Los Angeles District:

The vineyards in the counties embraced in my district may generally be said to be in much better condition than they were last year at this time, especially so as regards the Anaheim disease, which you know has done such enormous damage to vineyards in this section during the last ten years. We have had a very limited rainfall in our winter months, giving us thereby a greater number of dry months than in years which give us normal rains, and the dry months have generally been the ones which were supposed to be favorable to the spread of this malady. This cannot be said of it this year. From the best information which I could obtain by personal inspection and through correspondence, I have come to the conclusion that the disease has about run its course. There are here and there, however, a few sporadic cases, but the number of new cases, compared with those in former years, is so insignificant that unless especially looked for, it would not cause comment.

The vineyards as a whole in the San Gabriel Valley—the section which suffered so severely from the Anaheim disease—are now in fairly

good condition. A few isolated remnants of the Anaheim disease are scattered about, but no place has been observed, as far as I could learn, where this disease has attacked this year new vines, *i. e.*, those that have hitherto been entirely free from it. There are quite a number of old cases of affected vines, which send out puny little shoots during the spring of the year and then die. I have also noticed, within the past three years, that many stumps of diseased vines, which had been attacked during more recent years, are still making a more vigorous growth each year, and I should not be surprised to see many of these vines ultimately recover. Should this be the case, then the destroying power of the disease is decreasing from year to year. Heretofore a vine attacked one year would perhaps make a slight effort to sprout again the next, and then cease. On examining the vine it would be found dry throughout and dead. I have therefore concluded that the attacks of the disease are now less violent in their nature than they were some five years ago, and consequently less damaging in their effect. It looks reasonable to me at this time that the malady has about run its course here. However, this disease has been so full of surprises, and its nature so changeable, that I should not like to be understood as reporting its complete extinction, and that it would now be safe to plant vines of the Mission and Muscat varieties (these varieties, you will remember, were the most susceptible to the Anaheim disease, and generally succumbed to it) on lands which were once planted to these varieties of grape, with the expectation that they would not again be attacked. Vineyardists who have made plantings of these vines in vineyards where the disease at one time was most pronounced, now claim that the new plants set out by them are vigorous and entirely free from the least sign of Anaheim disease, and I am personally cognizant of a vineyard which has been extensively replanted during the last few years with Mission cuttings, and these are doing finely to-day. Quite a crop of grapes is expected to be harvested from them this season.

Outside of these replantings and experimental plantings no new vineyards have been set out, but on the contrary the vines on quite a number of acres have been uprooted, to devote the land to more profitable farming, owing to the low prices which grapes have realized during the last few years.

Owing to cold foggy weather in the summer of last year, and slight rainfall in July, in certain sections more or less mildew resulted; in other localities chlorosis did some damage; but these effects were entirely of a local character, and the general result was therefore a generous crop of grapes.

So far this year the vineyards in nearly all my district are reported to be in fair condition, and where taken care of and irrigated, the outlook, at present, is for a good crop of grapes, although the vintage promises to be late, unless we should have considerable warm weather to facilitate the ripening of the fruit.

I have had some reports of damages done to vineyards by cutworms during the spring of the year, and have recommended the use of a Paris green and bran mixture. The result obtained thereby in ridding the vines of these pests was generally satisfactory. To properly prepare it Mr. R. C. Allen, General Manager of the Sweetwater Fruit Company of Bonito, San Diego County, recommends using three pounds of Paris green to a sack of bran; mix while dry, and then moisten with water,

slightly; throw a little of this mixture at the base of each vine, and the cutworm will greedily devour it. The vines will soon be free from worms.

Respectfully submitted.

E. C. BICHOWSKY,
Commissioner for the Los Angeles District.

REPORT OF ALLEN TOWLE,

Commissioner for the El Dorado District.

TOWLE, July 20, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: Since the last report by my predecessor, the late George G. Blanchard, there has been but little change in the status of the wine makers, the brandy distillers, and the vineyardists of this district who grow the wine grape varieties.

Mr. Blanchard, before submitting his report, made a thorough canvass of the counties comprising the El Dorado District, and his observations were comprehensive in every particular.

While the wineries and distilleries of my district are as a rule smaller than those of the heavier producing sections in the bay counties, they are widely distributed. There is scarcely a mountain county but what has its vineyards and its wineries, supplying a good local trade. It must be remembered that in most of these counties there is a large population of foreign birth or origin, and their consumption of home-made wine is large per capita, giving market for the product of most of the vineyards and small wineries. Then, again, there are very considerable wineries in Marysville, in Nevada County, and in Placer County which ship to other than local markets.

I do not anticipate that there will be any considerable planting of new vineyards in the near future, to supply outside markets. The price of new wine in first hands is too low to preclude that, great as is the admitted desirability and adaptability of the foothills of the Sierra for producing excellent wine. I anticipate, rather, that the wine vineyardists and wineries in these counties will continue in the even tenor of their way, producing what is needed for the demands of their respective localities, and leaving it to counties favored with better transportation facilities to produce for the Eastern markets.

That the foothills are well adapted in every particular for producing excellent wines will, I think, be admitted by all, but the time does not appear propitious for any immediate development of these resources.

I have not succeeded in obtaining data from which to make an extended report as to raisins and table grapes. The table grapes are of great value and importance to the vineyardists wherever transportation is within easy reach. There were 130 carloads of table grapes shipped from Placer County alone last year.

Respectfully,

ALLEN TOWLE,
Commissioner for the El Dorado District.

REPORT OF R. D. STEPHENS,

Commissioner for the Sacramento District.

SACRAMENTO, July 26, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: The season of 1894 thus far has been very favorable to the grape crop in this section of the State. While it is true that there has been some damage done to Tokays by the heat and sun, yet it is small in comparison to what it has been during some seasons in the past, and the indications now are, owing to favorable weather conditions, that the table grapes will be of superior quality; in fact, all grapes are looking well.

In consideration of the fact that my fellow members of the Commission have given their time and attention to the wine-producing industry alone, which is a very proper thing for them to do, for the reason that that is where the interests of those whom they represent lie, and knowing that they have been thorough and sincere in their efforts to promote this interest, and successful to a great degree, I have concluded that I could not do better than to give some time and attention to the table grape product of this State. I believe that there are but few, comparatively speaking, who have anything like a definite idea as to the magnitude of table grape growing in California, and that there are many who desire information regarding this great interest. Therefore, with the object in view to supply this want, I have devoted much time and attention in obtaining such information concerning the same as the facilities at my command would permit, and I feel satisfied that the following statement, showing the shipments made during the season of 1893, closely approximates the actual amount of the crop thus disposed of:

Shipments of table grapes in 1893......19,043,200 lbs.—952,160 single crates—1,002 carloads.

As to varieties, there was about 60 per cent Tokays and the balance were Muscats, Cornichons, Malagas, Emperors, Fontainebleaus, and some other varieties.

Yours, respectfully,

R. D. STEPHENS,
Commissioner for the Sacramento District.

REPORT OF I. DE TURK,

Commissioner for the Sonoma District.

SANTA ROSA, September 1, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith submit my report for the year 1894.

There is comparatively little to be added to the comprehensive report made to me, under your direction, by Mr. Allen B. Lemmon. But few if any vineyards have been set out, and only a few vineyardists, who have lost their vines through the phylloxera, have replanted resistants;

and on the other hand, others, becoming discouraged, have pulled out their vines. The acreage of vines in the county I should place at something over 20,000.

The phylloxera still continues its work. From Glen Ellen down the Sonoma Valley there are few if any vineyards not on resistant vines. The vineyards of the Los Guilicos Valley are badly affected and can last but a short time longer. A new center of infection, at Geyserville, threatens the vineyards in the northern portion of the county. It is a satisfaction to know that comprehensive instructions as to resistant vines—and particularly as to new and highly recommended hybrids from France—will soon be at the disposal of vineyardists who desire to replant.

The yield of wine in the vintage of 1893 was very large, and failing to receive remunerative prices in San Francisco, many more wine makers have gone into business shipping wine East on their own account, hoping to thus secure better returns. It appears to me that, in view of the failure of the grape growers and the wine makers to come to any agreement with the California Wine Association as to a scale of prices to be paid for five years more, wine makers will enter the shipping field as their resources will permit.

Respectfully,

I. De TURK,
Commissioner for the Sonoma District.

REPORTS OF COMMISSIONERS—1893.

REPORT OF CHARLES BUNDSCHU,

Commissioner for the San Francisco District.

SAN FRANCISCO, June 12, 1893.

To the honorable the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith submit the following report of the condition of the vineyards in Alameda County, as obtained by Frank L. Fowler, Esq., under direction of myself. I also submit the report of the Secretary of the Board recapitulating the statistics obtained by Mr. Fowler.

Respectfully submitted.

CHARLES BUNDSCHU,
Commissioner for the San Francisco District.

LIVERMORE, ALAMEDA COUNTY, April 18, 1893.

Hon. CHARLES BUNDSCHU, *Commissioner for the San Francisco District, State Viticultural Commission:*

DEAR SIR: I herewith beg leave to submit for your consideration the result of my labors in preparing statistical information relative to the vineyards in Alameda County. I have been most careful in gathering these viticultural facts and figures, and, as such, you will find them entirely reliable.

In addition to them I wish to present to your attention other and more general information that came to my knowledge.

I find throughout the county that with but few exceptions the vineyards have been most carefully handled, and given thorough cultivation, good pruning, and training.

Many vintners seem most anxious to improve their product by grafting the higher types of grapes on their more common stocks. There is an intelligent endeavor to experiment and improve upon the methods of making wine, and it seems to be the ambition of the wine makers to establish brands of their own. This I consider to be one of the most hopeful and cheering promises of future prosperity to the industry.

The districts are as follows: Livermore, Pleasanton, Suñol, Vallecitos, Mission San José, Warm Springs, Niles, and Haywards.

LIVERMORE VALLEY.

In the Livermore Valley, I am pleased to say I have been unable to find any indication of the presence of the dreadful pest, phylloxera. Great care has been taken from the first planting of vineyards in 1881 that no cuttings or roots should be introduced from an infected district

without first being thoroughly disinfected. This precaution was almost universal, whether the stock came from a known infected region or not. It was the members of the honorable Commission of which you are a member that urged upon the vine planters the necessity of this precautionary course, and to-day the Livermore Valley vineyard owners congratulate themselves on their freedom from the disease, and feel grateful to the Commission for their wise forethought.

The general character of the soil is a sandy loam, and in places mixed with gravel, varying in color from red to black; deep and fairly rich. The growth of the vines is rapid and strong, but with few exceptions the crops are not heavy—the bunches and berries being generally small. The theory is that during the summer season the evaporation caused by the warmth of the sun is not counterbalanced by damp or foggy nights, as occur in many other grape sections. However, it is claimed by many that this has the effect of producing a higher quality of grape for wine making.

The crop of the season of 1892 was light, owing to severe frosts that came at a time when the vines were in bloom. The upland and mountainous sections escaped without injury, but the low-lying vineyards suffered severely. It is thought that at least one third of the crop was destroyed.

There was sufficient cellar capacity to accommodate the crop, but no surplus. If the valley has a full crop this year—and at date everything points to a large yield—the present cellars will be inadequate to handle it.

There is an excellent business opportunity for a large public winery that would pay the investors well.

The indications are that before the next vintage the cooperage will be mostly empty.

There have been about 300 acres of vines dug up this season by disappointed vineyard owners, but the great proportion of grape growers are sanguine that much better prices will prevail hereafter.

MISSION SAN JOSÉ.

In the Mission San José district I find that the phylloxera has gained a foothold, and the viticulturists are taking radical precautions to check its spread. In the vineyards where its presence has been discovered the vines in and around the infected spot have been destroyed and gas lime applied at once. I found a reluctance on the part of the owners of infected vineyards to give me information.

The grape output in 1892 was satisfactory so far as crop returns go, but like the balance of the vintners in the State, all are looking forward with hungry eyes and empty pockets to better prices for grapes and wines.

The cellarage capacity seems ample to accommodate the coming crop.

WARM SPRINGS.

In this district I did not learn of any vineyard infected with phylloxera. In every other particular its soil, climate, and conditions are similar to the Mission San José district.

OTHER DISTRICTS.

The Suñol and Vallecitos vineyard plantations are small and few in number, and are entirely healthy. The soil is different grades of loam, and gravel mixed with loam. There are no wineries in either section.

At Haywards I find but few vineyards, and very small plantings are the rule. The vineyards are nearly all planted to table grapes, which are largely sold locally and shipped to San Francisco. Most of the vineyards are owned by Portuguese, and each owner makes enough wine for his own use.

There has been but little planting of vines in Alameda County during the last few years. Nearly all the vineyards are in full bearing. I should judge that the acreage of new vineyards planted during the last three years does not exceed two hundred acres.

During my visits to the different vineyards I find almost invariably that where the owner of a vineyard is a foreigner he makes enough wine for his home use, *and he uses it.* This is not true of the American-born owner. When the wine bottle on the home table of our people takes the place of the whisky and beer bottles on the saloon counters, we will have advanced one great step in the pathway of civilization.

I am most respectfully yours,

FRANK L. FOWLER.

San Francisco, May 17, 1893.

Charles Bundschu, *Esq., Viticultural Commissioner for the San Francisco District, San Francisco:*

Dear Sir: At your request I have prepared a summary of the figures and statistics secured in the recent canvass of Alameda County, made under your direction. The county was divided into several districts for the mere intelligent grouping of the statistics.

The recapitulation of the total is as follows:

Alameda County.

Total number of vineyards		214.
Total acreage in vines		7,083¼ acres.
Total acreage in bearing		6,879¼ acres.
Acreage in wine grapes		6,690¼ acres.
Acreage in table grapes		295 acres.
Acreage in raisin grapes		98 acres.
Planted to resistants, 688¼ acres, as follows:	Riparia	484¼ acres.
	Rupestris	8 acres.
	Lenoir	2 acres.
	Other varieties	194 acres.
Planted to resistants (same as above), 688¼ acres	Grafted and in bearing	663¼ acres.
	Grafted but not bearing	0 acres.
	Not yet grafted	25 acres.
Crop in 1892		12,060 tons.
Stock of wine on hand		2,034,550 gallons.
Cooperage 4,147,150 gallons	Oak	2,266,650 gallons.
	Redwood	1,880,500 gallons.

The vineyards are distributed as follows:

Livermore.

Number of vineyards	100.
Acreage in vines	3,619¾ acres.
Acreage in bearing	3,558¾ acres.
Acreage in wine grapes	3,491¾ acres.
Acreage in table grapes	72½ acres.

Acreage in raisin grapes		55½ acres.
Planted to resistants, 170¼ acres, as follows:	Riparia	131¼ acres.
	Lenoir	2 acres.
	Other varieties	37 acres.
Planted to resistants (same as above), 170¼ acres—Grafted and in bearing		170¼ acres.
Crop in 1892		5,512 tons.
Stock of wine on hand		754,700 gallons.
Cooperage 1,397,900 gallons	Oak	369,400 gallons.
	Redwood	1,028,500 gallons.

VALLECITOS.

Number of vineyards	3.
Acreage in vines	3½ acres.
Acreage in bearing	3½ acres.
Acreage in wine grapes	None.
Acreage in table grapes	3½ acres.
Acreage in raisin grapes	None.
Planted to resistants	None.
Crop in 1892	5½ tons.

SUÑOL.

Number of vineyards		14.
Acreage in vines		148½ acres.
Acreage in bearing		138½ acres.
Acreage in wine grapes		123½ acres.
Acreage in table grapes		25 acres.
Acreage in raisin grapes		None.
Planted to resistants		None.
Crop in 1892		229½ tons.
Stock of wine on hand		15,200 gallons.
Cooperage 25,000 gallons	Oak	16,000 gallons.
	Redwood	9,000 gallons.

PLEASANTON.

Number of vineyards		21
Acreage in vines		648 acres.
Acreage in bearing		574 acres.
Acreage in wine grapes		603½ acres.
Acreage in table grapes		44 acres.
Acreage in raisin grapes		½ acre.
Planted to resistants		None.
Crop in 1892		1,357½ tons.
Stock of wine on hand		7,400 gallons.
Cooperage 12,650 gallons	Oak	7,850 gallons.
	Redwood	4,800 gallons.

NILES.

Number of vineyards		9.
Acreage in vines		148 acres.
Acreage in bearing		148 acres.
Acreage in wine grapes		77 acres.
Acreage in table grapes		37 acres.
Acreage in raisin grapes		34 acres.
Planted to resistants		None.
Crop in 1892		431½ tons.
Stock of wine on hand		500 gallons.
Cooperage 2,000 gallons	Oak	1,000 gallons.
	Redwood	1,000 gallons.

MISSION SAN JOSÉ.

Number of vineyards		32.
Acreage in vines		1,564½ acres.
Acreage in bearing		1,508½ acres.
Acreage in wine grapes		1,553½ acres.
Acreage in table grapes		11 acres.
Acreage in raisin grapes		None.
Planted to resistants, 515 acres, as follows:	Riparia	353 acres.
	Rupestris	8 acres.
	Other varieties	154 acres.
Planted to resistants (same as above) 515 acres	Grafted and in bearing	490 acres.
	Not yet grafted	25 acres.
Crop in 1892		2,853 tons.
Stock of wine on hand		911,000 gallons.
Cooperage 2,176,600 gallons	Oak	1,501,900 gallons.
	Redwood	674,700 gallons.

HAYWARDS.

Number of vineyards	26.
Acreage of vines	68 acres.
Acreage in bearing	63 acres.
Acreage in wine grapes	15½ acres.
Acreage in table grapes	52½ acres.
Acreage in raisin grapes	None.
Planted to resistants	None.
Crop in 1892	151 tons.

WARM SPRINGS.

Number of vineyards			18.
Acreage in vines			885 acres.
Acreage in bearing			885 acres.
Acreage in wine grapes			838 acres.
Acreage in table grapes			39½ acres.
Acreage in raisin grapes			8 acres.
Planted to resistants			3 acres.
Planted to resistants (same as above), 3 acres—Grafted and in bearing			3 acres.
Crop in 1892			1,520 tons.
Stock of wine on hand			345,750 gallons.
Cooperage	534,800 gallons	Oak	371,400 gallons.
		Redwood	163,400 gallons.

Trusting the foregoing is satisfactory, I am very truly yours,

WINFIELD SCOTT.

REPORT OF I. DE TURK,

Commissioner for the Sonoma District.

SANTA ROSA, June 30, 1893.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith submit the report of Allen B. Lemmon, Esq., on the condition of the vineyards of Sonoma County, and the census of the same, as obtained by him under my direction, together with the report of Winfield Scott, Secretary, on the scope of the work and the recapitulation of the figures obtained.

Respectfully submitted.

I. DE TURK,
Commissioner for the Sonoma District.

SAN FRANCISCO, June 30, 1893.

Hon. I. DE TURK, *Commissioner for the Sonoma District:*

SIR: At your request I have prepared a recapitulation of the census of Sonoma County made under your direction:

TOTAL IN SONOMA COUNTY.

Total number of vineyards	832.
Total acreage in vines	23,291½ acres.
Acreage in bearing	21,908½ acres.
Acreage in wine grapes	22,613 acres.
Acreage in table grapes	664½ acres.
Acreage in raisin grapes	14 acres.
Infested by phylloxera	801 acres.
Same good for but one crop more	328 acres.

Planted to resistants	2,328½ acres	Riparia	278 acres.
		Rupestris	None.
		Lenoir	289 acres.
		Other	136 acres.
		Variety not named	Balance.
Planted to resistants	2,328½ acres	Grafted and bearing	684½ acres.
		Grafted but not bearing	108 acres.
		Not yet grafted	9 acres.
		Not reported	Balance.
Crop in 1892			48,409¾ tons.
Cooperage	7,676,300 gallons	Oak	2,595,000 gallons.
		Redwood	5,081,300 gallons.

The recapitulation of the districts in the county is as follows:

First District.

Comprising Vallejo and Sonoma Townships.

Number of vineyards			136.
Total acreage in vines			5,535½ acres.
Acreage in bearing			4,942½ acres.
Acreage in wine grapes			5,182½ acres.
Acreage in table grapes			353 acres.
Infested by phylloxera			782 acres.
Same good for only one more crop			328 acres.
Planted to resistants	1,186 acres	Riparia	265 acres.
		Rupestris	None.
		Lenoir	259 acres.
		Other varieties	136 acres.
		Unspecified	526 acres.
Planted to resistants	1,186 acres	Grafted and in bearing	550 acres.
		Grafted but not in bearing	108 acres.
		Not grafted	48 acres.
		Unspecified	Balance.
Crop in 1892			5,870¼ tons.
Cooperage	2,840,000 gallons	Oak	877,000 gallons.
		Redwood	1,963,000 gallons.

Second District.

Comprising Analy and Petaluma Townships.

Number of vineyards			97.
Total acreage in vines			1,869 acres.
Acreage in bearing			1,841 acres.
Acreage in wine grapes			835½ acres.
Acreage in table grapes			32½ acres.
Acreage in raisins			1 acre.
Crop in 1892			5,000 tons.
Cooperage	267,050 gallons	Oak	42,050 gallons.
		Redwood	225,000 gallons.

Third District.

Comprising Santa Rosa and Russian River Townships.

Number of vineyards			384.
Total acreage in vines			7,894 acres.
Acreage in bearing			7,406 acres.
Acreage in wine grapes			7,745½ acres.
Acreage in table grapes			148½ acres.
Infested by phylloxera			18 acres.
Planted to resistants (not specified)			6 acres.
Crop in 1892			16,572½ tons.
Cooperage	1,663,300 gallons	Oak	800,800 gallons.
		Redwood	862,500 gallons.

Fourth District.

Comprising Cloverdale, Mendocino, Knights Valley, and Washington.

Number of vineyards	282.
Total acreage in grapes	7,241 acres.
Acreage in bearing	6,987 acres.
Acreage in wine grapes	7,105½ acres.
Acreage in table grapes	123½ acres.
Acreage in raisin grapes	12 acres.

Infested by phylloxera			1 acre.
Planted to resistants	136½ acres	Riparia	13 acres.
		Rupestris	None.
		Lenoir	30½ acres.
		Unspecified	Balance.
Planted to resistants	136½ acres	Grafted and bearing	134½ acres.
		Grafted but not bearing	None.
		Not yet grafted	2 acres.
Crop in 1892			19,327 tons.
Cooperage	2,260,500 gallons	Oak	398,200 gallons.
		Redwood	1,862,300 gallons.

FIFTH DISTRICT.

Comprising the Townships of Bodega, Ocean, Redwood, and Salt Point.

Number of vineyards			33.
Total acreage in vines			752 acres.
Acreage in bearing			732 acres.
Acreage in wine grapes			744 acres.
Acreage in table grapes			7 acres.
Acreage in raisin grapes			1 acre.
Crop in 1892			1,640 tons.
Cooperage	646,450 gallons	Oak	476,950 gallons.
		Redwood	169,500 gallons.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

SANTA ROSA, CAL., June 20, 1893.

Hon. I. DE TURK, *Viticultural Commissioner for the Sonoma District:*

DEAR SIR: Herewith I submit my report of the canvass of Sonoma County in the collection of vineyard and wine statistics, as per blank forms furnished by you for such purpose.

In doing this work, I first sent a circular letter to all vineyardists, with a blank form and addressed stamped envelope for the reply, asking for the desired information. This was preliminary to the general visitation of the county, and thus I secured a showing from about two hundred vineyardists. This was followed by visitation to every neighborhood and to almost every vineyard.

The statistics have been collected and classified by supervisor districts, of which there are five. After careful study of the county, this seemed to me to be the most satisfactory division of the territory. The first district includes the Sonoma Valley, in which phylloxera has done the greatest damage, with some contiguous country. The vineyards about Sebastopol, in Analy township, and the few vineyards about Petaluma constitute the second district. The third district is composed of Santa Rosa and Russian River townships; the fourth of the Healdsburg country and the territory north and east of there, and the fifth the coast region of the county.

Much attention has been given to the vineyards infested by phylloxera. In some instances the patience of the owners has been wearied by the questions asked. It was ascertained that in some instances high fertilization and very thorough cultivation were tried, but the ravages of the disease continued just the same. One or two flooded their vineyards with water, where it could be done, but this did not tend to check the deadly work of the disease. Bisulphide of carbon was tried, but it proved too expensive, and is not known to have done much good. Such

efforts to save vineyards were exceptional cases. Most grape growers have made no effort whatever at special treatment, either digging out the infested vineyard and planting the ground to something else, or replanting with resistants as the old vines have died.

From the best information obtainable, I conclude that the first appearance of phylloxera in this county was in the Dresel-Gundlach vineyard, a few miles south of Sonoma, in 1874 or 1875. There, much money was expended on suggested remedies and in experimenting with resistants. In time all the old vines were destroyed and resistants took their place, and the vineyard is now in a very flourishing condition.

From this old and noted vineyard the phylloxera has extended north some twenty miles. At Glen Ellen, it crossed over into Bennett Valley some five or six years ago, through which it has entered northward several miles. Three years ago the disease made its appearance in the Upper Russian River Valley, in the vineyards of L. G. Ellis and C. P. Moore. These vineyards are about three miles apart, and the river flows between them. Mr. Ellis can offer no explanation for the appearance of the insects in his vineyard, unless it was brought there with some cuttings received from a district in which phylloxera has since shown itself. Mr. Moore shipped some of his grapes to a winery in an infested district a few years ago, and he thinks the troublesome insect may have been carried to his home in the boxes returned. There are one or two other vineyards in the neighborhood of that of Mr. Moore in which a considerable number of vines have died, but the owners attribute the loss to other causes.

The work of destruction is very apparent in the extensive vineyard owned by J. G. Fair in Vallejo township. One field of nearly forty acres is badly infested, and a single spot of a few rods square was found in a neighboring vineyard.

In all other sections of the county the vines were found to be healthy, except an occasional touch of black knot. The people owning vineyards on the deep, sandy loam that predominates in Analy township are quite hopeful that vines in soil of that character are safe from attacks of phylloxera, but those cultivating the heavier loams do not speak with as much confidence. Within a few days, men who pronounced their vines healthy two months ago have reported the recent appearance of phylloxera in their vineyards.

In the Sonoma Valley a considerable number of resistant vineyards have been planted, but many old vineyards have disappeared and their owners have abandoned the culture of the grape. In other portions of the county there is much talk of turning attention to other crops. Grape growers are generally much discouraged—some on account of the ravages of the phylloxera, and others at the low prices which have long prevailed. While a few have added somewhat to their vineyards and are hoping that the day is not distant when grape growing will be again profitable, the greater number are discouraged.

As will be seen by examination of the detailed report submitted, many more Riparia have been planted than any other of the resistant variety. While these vines are slower growers than some others, they are generally regarded as the most reliable. As most of the resistant vineyards are young, just coming into bearing, it has not been possible to get much information in regard to results. At the same time, it may be said that

there is great confidence that resistant vineyards will be permanent, and that in the near future they are likely to be profitable.

In attempting to grow resistant vineyards, there have been some mistakes in grafting. It will not do to graft too low. If this is done the grafts are likely to throw out roots, and in time take the place of the resistant root. This is followed by phylloxera killing the vine, and thus all the work and expense have been for naught. It seems settled that the graft should be put in at about the surface of the ground. There is difference of opinion as to the kind of grafting best to apply to the grape, as will be seen by examination of the remarks of some of the vineyardists.

While phylloxera has done great harm in portions of this county, it is gratifying to note the many large and important districts in which the vines are still healthy and give promise of good returns. In journeying about the county, not nearly as many infested vineyards were found as had been reported. With great valleys as well as large areas of upland entirely free from phylloxera or other disease, after its existence in parts of the county for many years, it would seem likely that the prominence of this section for grape growing and wine making will long be maintained.

The increased acreage of table grapes is noted. Also, that this crop is usually quite profitable. There are a considerable number of such vineyards, and more are being planted every year.

While the report shows returns from 832 vineyards, aggregating 23,291½ acres, with a yield last year of 48,409¾ tons, there are many small vineyards of less than five acres which have not been reported. It is believed that there are at least one hundred of these, whose aggregate acreage is certainly 250.

The winery returns are not as complete as would be desirable, but the best has been done. Some wine makers have declined to give any figures, and others have made statements that were afterward found to be incorrect. In some instances two letters were written without getting any returns, and afterward, on visiting the winery, nobody was found there who was able to give the particulars asked for.

The collection of these statistics was not an unpleasant task. Most grape growers were found to be very reasonable and accommodating. After frankly talking the matter over with them, not more than a half dozen declined to answer the questions asked to the best of their ability. In doing this work the writer has had opportunity to meet in a friendly way and talk a few minutes with most of the men in this county engaged in this important industry. This has given me a knowledge of their business that could have been secured in no other way, and in submitting this report I return thanks to you for the favor you bestowed in permitting me to make this canvass.

Respectfully submitted.

ALLEN B. LEMMON.

REPORT OF E. C. BICHOWSKY,

Commissioner for the Los Angeles District.

SAN GABRIEL, October 14, 1893.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I herewith take pleasure in submitting to you the report of Professor Ethelbert Dowlen, on the counties of Los Angeles, Orange, San Bernardino, Riverside, and San Diego, together with a census and directory of vineyardists, as obtained by him.

Respectfully,

E. C. BICHOWSKY,
Commissioner for the Los Angeles District.

SAN FRANCISCO, October 30, 1893.

Hon. E. C. BICHOWSKY, *Commissioner for the Los Angeles District:*

SIR: At your request I have prepared a recapitulation of the reports on vineyards, made under your direction. I have purposely omitted any recapitulation of the stocks of wine on hand, as the reports are difficult to obtain correctly, and the results are often misleading. The report on the crop in several districts, notably in Orange and Riverside Counties, is not complete.

The blank used in the southern counties was as follows:

.... COUNTY.
.... DISTRICT IN COUNTY.
Name and address ....
Total acres in vines ....
Acres in bearing ....
Acres in wine grapes ....
Acres in table grapes ....
Acres in raisin grapes ....
Acres planted season of 1892-3 ....
Character of the soil of the vineyard ....
How is the vineyard situated—lowlying, upland, or mountain? ....
Crop in 1892 ....
Stock of wine on hand, in gallons ....
Total quantity of cooperage .... gallons: { Oak cooperage .... gallons. / Redwood cooperage .... gallons. }
Remarks: ....
....

The returns tabulated are as follows:

LOS ANGELES COUNTY.

Counties.	Total Acres in Vines	Acres in Bearing	Acres in Wine Grapes	Acres in Table Grapes	Acres in Raisin Grapes	Acres Planted in Season of 1892-3	Crop in 1892.
Alhambra	35	18	35			17	50 tons grapes.
Altadena	5	5	5				13 tons grapes.
Antelope	193	42	1½	½	191	102	
Artesia	123½	97½	123½			23	407 tons grapes.
Big Rock Creek	46	6	5	2	39		230 tons grapes.
Downey	86	56	86			30	200 tons grapes.
Glendale	150	150	150				721 tons grapes.
La Cañada	15	15	10		5		20 tons grapes.
Lamanda Park	1,113	1,105	1,068	3	42	3	2,961 tons grapes.
Los Angeles	16	16	16				
Lordsburg	8	8	8				25 tons grapes.
Manzana	40				40	40	123 tons grapes.
Monrovia	55	55	55				785 tons grapes.
Norwalk	255	236	255			19	
Palmdale	7	5	7				
Pomona	166	160	156	5	5		746 tons grapes.
Ramona	320	300	320			20	300 tons grapes.
Roscoe	200	200	200				1,200 tons grapes.
San Gabriel	1,347	1,337	1,347			5	1,670 tons grapes.
Santa Fe Springs	89	74	71	18		15	215 tons grapes.
Sierra Madre	82	82	82				190 tons grapes.
Tropico	92	84	82½	9½		8	140 tons grapes.
	4,443½	4,091½	4,083½	38	322	282	9,996 tons grapes.

ORANGE COUNTY.

Counties.	Total Acres in Vines	Acres in Bearing	Acres in Wine Grapes	Acres in Table Grapes	Acres in Raisin Grapes	Acres Planted in Season of 1892-3	Crop in 1892.
Anaheim	49	29	47		2	15	17 tons grapes.
El Toro	22	22	10	12			56 tons grapes.
Fullerton	83	83	42		41		55 tons grapes.
McPherson	58	24			58	10	
Orange	223	109½			223	21	
Tustin	166½	95½			166½	27	
	601½	363	99	12	490½	73	128 tons grapes.

SAN BERNARDINO COUNTY.

Counties.	Total Acres in Vines	Acres in Bearing	Acres in Wine Grapes	Acres in Table Grapes	Acres in Raisin Grapes	Acres Planted in Season of 1892-3	Crop in 1892.
Banning	60	60	60				360 tons grapes.
Beaumont	87	87	87				200 tons grapes.
Bloomington	214	214			214		
Cotton	60	60	20		40		45 tons grapes.
Cucamonga	1,275	940	768	4	503	11	175 tons raisins. 2,113 tons grapes.
Dry Ranch	263	202		1	262	10	12½ tons raisins. 50 tons grapes.
East Highland	9	9			9		8 tons raisins.
Etiwanda	906½	818½			906½	14	531¼ tons raisins.
Grapeland	265½	221	55		210½		25 tons grapes. 58 tons raisins.
Hesperia	271	211			271	60	95 tons raisins.
Highland	91	91			91		93½ tons raisins.
Rialto	631½	601½	52		579½		18 tons raisins. 245 tons grapes.
Redlands	282½	282½	85		197½		450 tons grapes. 148 tons raisins.
Rochester	930½	907½			930½		3½ tons raisins.
San Bernardino	493	493	468		25		1,440 tons grapes.
	5,839½	5,198	1,595	5	4,239½	95	4,928 tons grapes. 1,142¾ tons raisins.

RIVERSIDE COUNTY.

District.	Total Acres in Vines	Acres in Bearing	Acres in Wine Grapes	Acres in Table Grapes	Acres in Raisin Grapes	Acres Planted in Season of 1892-3	Crop in 1892.
Dry Ranch	479	108		2	477	22	4½ tons raisins.
Perris	30	5			30	10	½ ton grapes.
Rincon	170	170			170		
Riverside	621	621			621		377½ tons raisins.
South Riverside	51	48	23		28	3	91 tons grapes.
Yorba	160	160	160				50 tons grapes.
	1,511	1,112	183	2	1,326	35	141½ tons grapes. 382 tons raisins.

SAN DIEGO COUNTY.

District.	Total Acres in Vines	Acres in Bearing	Acres in Wine Grapes	Acres in Table Grapes	Acres in Raisin Grapes	Acres Planted in Season of 1892-3	Crop in 1892.
Alpine	46	46	12		34		10 tons grapes.
Bernard	15	10		2	13		13 tons raisins.
Buena	4	4			4		5 tons raisins.
El Cajon	2,632	2,632	8	15	2,609		78 tons grapes. 1,350 tons raisins.
Escondido	307¼	284¾	29	10	268¼		169¼ tons raisins. 86 tons grapes.
Fallbrook	10	10			10		10 tons raisins.
Jamul	33	33			33		4 tons raisins.
Lakeville	39	39	20		19		6½ tons raisins. 80 tons grapes.
Otay	227½	166½	152	1½	74	4	350 tons grapes.
Palm Valley	193	193		8	185		
Poway	338	332			338	6	60¼ tons raisins.
San Diego	29	29			29		10 tons raisins. 40 tons grapes.
San Marcos	28	28	20		8		40 tons grapes.
San Pasqual	35	23			35	11	11 tons grapes.
Sweetwater Valley	311	300		11	300		207¼ tons raisins.
Twin Oaks	94	94	73		21		12 tons raisins. 370 tons grapes.
Vista	82	67	67		15		63 tons grapes.
	4,423¾	4,290¼	381	47½	3,995¼	21	1,117 tons grapes. 1,858¾ tons raisins.

GRAND TOTAL OF SOUTHERN COUNTIES.

District.	Total Acres in Vines	Acres in Bearing	Acres in Wine Grapes	Acres in Table Grapes	Acres in Raisin Grapes	Acres Planted in Season of 1892-3	Crop in 1892.
Los Angeles	4,443½	4,091½	4,083½	38	322	282	9,996 tons grapes.
Orange	601½	363	99	12	490½	73	128 tons grapes.
Riverside	1,511	1,112	183	2	1,326	35	141½ tons grapes. 382 tons raisins.
San Bernardino	5,839½	5,198	1,595	5	4,239½	95	1,142¾ tons raisins. 4,928 tons grapes.
San Diego	4,423¾	4,290¼	381	47½	3,995¼	21	1,117 tons grapes. 1,858¾ tons raisins.
	16,819¼	15,054¾	6,341½	104½	10,373¼	506	16,310½ tons grapes. 3,383½ tons raisins.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

SAN GABRIEL, October 9, 1893.

Hon. E. C. BICHOWSKY, *Commissioner Los Angeles District:*

SIR: Herewith I beg to hand the report of my visit to the vineyards of the Los Angeles district. The statistics have already been forwarded to San Francisco, and would have been sent in earlier only that many people were away from home, which has caused delay in obtaining the necessary information. In addition to this, there was a considerable area of newly planted vineyards to be gone over, which have all been set out since the issuing of the last edition of the directory. The long distances to be traveled by buggy have also greatly lengthened the time required to traverse the various districts.

The vineyards in the southern counties of the State are, on the whole, in a better condition than they were last year. In the early part of the year the vines looked better than they had done for the last five years. This better condition has been kept up in most places, though in some instances there has been a falling off, but generally speaking a better growth has been made and the promise of a larger crop has been fulfilled.

ANAHEIM, OR CALIFORNIA DISEASE.

With respect to the Anaheim, or California disease, it is not easy to make any statement that may be [illegible] taken as definite. This disease remains as vexatious as ever, so far as cause and cure are concerned, but it appears to be slowly losing its deadly power. It also evidently starts a little later each year; in fact, it is now scarcely possible to make any reliable estimate of the amount of disease present in a district before November, whilst a few years ago its presence was fully declared by August, and the first symptoms were observable much earlier than that. This year the disease is present over a larger area perhaps than it was last year, but it does not appear to be doing so much injury. Here and there purely local conditions seemed to have favored a stronger attack, but on the whole it seems to be slowly decreasing in virulence. This is certainly the case in some places, where vines, which last year showed a considerable proportion of foliage having the usual yellow markings, have this year entirely recovered and are bearing a good crop of fruit. In the Santa Ana district also some vines were seen which were apparently quite healthy, although the original vineyard had been dug out some years since on account of disease; the ground since then has been regularly cropped with hay, but some of the old roots have regularly sent out a new growth, which has never yet shown any signs of sickness.

VINES BEING TAKEN OUT.

In some districts, especially where citrus fruits can be cultivated with advantage, there is still an inclination to take out vines and replant with citrus fruits. Other growers have either already set out deciduous trees amongst the vines, or will do so this next season, whilst some will take out the vines entirely, claiming that the low prices ruling for grapes, whether dried or green, leave them no other course.

NEW AREAS SET TO VINES.

In other districts considerable acreage has been newly set to vines, all of raisin varieties, within the last two years. Most of these new vineyard districts are in San Bernardino County, in the neighborhood of Rialto, Rochester, Bloomington, and the Dry Ranch districts. Part of this area is under irrigation, and part is not. The Dry Ranch district appears to have sufficient water without irrigation, as in August the soil was quite damp at a depth of from four to six inches from the surface. This, of course, was where the ground had been well cultivated. In all these newly planted-out districts the vines have made an exceedingly good start.

SOILS.

It is a rather difficult matter to make any satisfactory classification of soils in the southern counties. Speaking broadly, all the varieties of soil, except in a very few districts, are derived from the decomposition of granitic rocks, yet the soil in a small area will vary from the lightest sand to stiff adobe. On the other hand, large areas often range only from light to moderately heavy loam, the transition being very gradual.

SITUATION.

There are two districts which deserve special mention on account of their situation, viz: Hesperia, and what for the present may be called Antelope Valley district. These are both valley districts, yet their lowest points are between 2,000 feet and 3,000 feet above sea-level. Hesperia is a compact district, with a deep, rich soil, and a good supply of water. The soil is a red sandy loam derived from the decomposition of granitic rocks. The Antelope Valley district embraces points which are some forty miles apart from each other, Fairmont and Manzana being on the one side, Big Rock Creek, Myrtle, and Llano being on the other side, and Palmdale lying between. In these places also, the soil is deep and rich, and there is a good water supply in course of development. In each district the climate would seem to be specially adapted for drying fruits. Fogs are unknown; the nights, during the drying season, are warm, and the air is warm and dry.

HEALTH OF VINEYARDS.

Last year a report was sent to the Commission that a vineyard in Escondido had been newly attacked by the vine disease. An investigation was made, and it was found that the vineyard in question was not in the Escondido Valley proper, but in a cañon running down from the valley. A visit was made to the same vineyard this year, and it was found that though there were still a number of vines diseased, the number was not so great as it was last year, nor were the vines so badly affected. Some of the vines appeared to have entirely recovered. On the other hand several fresh cases of attack were found in other districts, but as a rule the disease appears to be much less deadly than it was. In the Cucamonga district also the vines were found to be less affected than they were last year. In this connection it must be remembered that in San Diego, San Bernardino, and Riverside Counties the vines

have never suffered from disease to the extent that they have in some other districts.

The newly set out vineyards in Orange County have made an exceedingly good growth, and in many instances show no signs of disease; yet many other cases could be found where the first signs of disease could be easily seen, though here, as in other districts, the disease appears to have lost much of its former destructive power. But it is still too early to venture upon any statements on this subject.

In some districts there was a considerable amount of discouragement, owing to the low prices ruling for grapes, whether for wine or for raisins. In the El Cajon and Sweetwater Valley districts the growers have succeeded in establishing a reputation for their own district by united action in packing their crops. The greater number of growers have packed their crops together, and so established a brand for the district, which will be permanent, no matter how much the ownership of the vineyards may change. This arrangement has already brought about good results; in fact, the arrangement worked so well last year that operations will be carried on on a much larger scale this season. It would probably be well for growers in other districts to adopt some such plan of united working as that noticed above, and so not only bring more system into the grading and branding of their crops, but also at the same time secure for themselves better returns for their labor.

ETHELBERT DOWLEN.

The above report is indorsed, and submitted to the Commissioners.

E. C. BICHOWSKY,
Commissioner for the Los Angeles District.

REPORTS OF COMMISSIONERS—1892.

REPORT OF E. C. BICHOWSKY,

Commissioner for the Los Angeles District.

SAN GABRIEL, October 27, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: On the morning of the 13th inst. appeared an article in the "Los Angeles Times," announcing that the dreaded vine malady, known as the "Anaheim disease," had again appeared in the section from which it derived its name, after having apparently left it for a number of years, attributing its appearance at this time to planting of vines in soil heretofore set out in vines destroyed by the malady, and claiming that the contagious germs remained dormant in the ground until material was furnished them to prey upon. It will be remembered that this peculiar disease, which has played such sad havoc with one of the most prominent industries of Southern California, is said to have originated some years ago in that part of Los Angeles County which now constitutes Orange County, and destroying since then almost completely thousands of acres of vineyards in that and adjacent territory, leaving them bleak and desolate. After the vineyards had been cleared of the dead vines by uprooting same, and a crop of grain had been raised on them, it was determined, as an experiment, by a few former owners of vineyards, to replant this land again with grapevines, obtaining their cuttings from districts where the disease had not heretofore been observed. Those who had the courage to make the attempt at the end of the first year found apparent success crowning their efforts, for the young vines had passed through the trying time general to all plants, making a good growth, vigorous in appearance, and evidently free from all disease. Others, emboldened by the success of their neighbors, set out other small vineyards, and the prospects were indeed again favorable for the establishment of vineyards in this and other districts.

It was but recently I was informed, upon inquiry, that the young vineyards planted in Orange County were thriving. I was therefore greatly surprised to read the article announcing the reappearance of the disease in that section. Knowing that a number of parties in Orange and Los Angeles Counties, owing to the apparent departure of the disease, intended to plant vines largely this coming year, I determined to investigate the reports, and if I found the disease again appearing in a locality where it was reasonable to believe it had become extinct, it would be my duty to inform all those interested of this fact.

On the morning of the 25th inst. I left for Santa Ana, accompanied by Professor Ethelbert Dowlen, viticultural expert, whom I had requested to go with me on my tour of inspection. At Santa Ana we were met by

Mr. E. S. Wallace, a resident of that city, and author of the above-mentioned newspaper article, together with Professor Newton B. Pierce, Government pathologist. This latter gentleman is at present located in Santa Ana, and kindly accepted an invitation to join us. Ten vineyards were visited during the day, four of which were entirely free at that time from any signs of disease, while six showed the apparent baneful influence of the destroyer in a greater or less degree. In going to Santa Ana, my object was to inspect those vineyards which had been reputed to be contaminated with the malady, and *not* so much to inspect vineyards free from disease; therefore, while we saw evidences of disease in six out of ten inspected, it is not fair to assume that such a large proportion of all the vine-producing areas in that district are thus affected.

The first vineyard visited is located a short distance from the town of Orange. There are about ten acres of vines in this place, planted on coarse, gravelly soil, but from appearance of plants there must be sufficient loam underneath to force the growth to a remarkable degree. Considering that these vines are only six months old, runners measuring from six to ten feet in length are rather surprising for such young plants. A number of these vines also showed small bunches of grapes. No disease was visible here.

The next vineyard was a field of ten acres belonging to Mrs. Blaisdell. This property is about a mile from the first vineyard visited. Here the first evidence of disease was detected, and especially was it pronounced upon a ridge running through a portion of this field. The soil there was evidently much poorer in quality than that surrounding it. On inquiry we ascertained that the cuttings in this vineyard had been set out on land which had formerly borne vines killed by the disease. These cuttings were said to have been brought from Elsinore in February, 1892, at which time they were thought to have been entirely free from disease.

The next vineyard visited was located on the Tustin branch of the Southern Pacific, and is the property of a Mr. McPherson. This was found free from disease. The soil is gravelly, with dark, heavy loam. Cuttings were said to have been set out in the spring of 1890, and up to the present time had retained their full vigor.

The next vineyard inspected is on the Hughes ranch. The soil here is gravelly, with light, sandy loam, and the vines were free from disease. Just across the road from the former is another small vineyard, in which the vines are young, healthy, and vigorous. Just back of this vineyard is the property of Mr. Sitton; this is also free from disease.

The sixth vineyard examined contained vines from six months to two years old, in the larger portion of which evidences of the disease were discovered. Here we observed that the young vines were not infected as much as the older ones.

The seventh vineyard was the property of C. B. Pulver. Here the disease was more marked than upon any other vines heretofore examined. The cuttings were obtained from Etiwanda, and were supposed to have been free from any infectious disease. They were set out in the spring of 1891.

The eighth vineyard visited adjoins the Santa Ana cemetery. The cuttings from which this vineyard was planted were also obtained from Etiwanda in the spring of 1890, and were believed to have been free from disease. Through this vineyard, as in one already mentioned, a slight elevation in the soil runs from north to south. The vines on this

show the signs of the disease more marked than those surrounding it on lower ground. When mentioning this to the owner, he explained that in his opinion the lack of vigor in these vines was due to the fact that they had not, perhaps, received as much irrigation as the neighboring ones. This vineyard was said to have borne a good crop. A number of grapes which were picked from the vines, however, had the unmistakable flavor so common with fruit plucked from vines afflicted with the Anaheim disease.

The ninth vineyard is the property of Fred Rohrs. These cuttings also came from Etiwanda in the spring of 1890. Like all other cuttings from that neighborhood, they were supposed to have been free from all disease, but to-day the vineyard shows unmistakable signs of the malady.

The last vineyard inspected is the property of Mr. Nisson. It contains only about two acres. The cuttings with which this small tract was planted, Mr. Nisson informed us, were obtained from San José in the year 1891. This vineyard, like some of the others, was planted where diseased vines were taken up in the winters of 1888 and 1889. Professor Pierce, who has made a study of this particular tract, had written to San José, where the cuttings were obtained, to ascertain whether any disease had made its appearance there. He was informed that no disease of the character described by him had shown itself in that valley, and to make their statement positive they sent him leaves from the identical vines which furnished cuttings for Mr. Nisson's vineyard. The leaves were perfectly green, being free from that spotted character so peculiar to the disease.

In four of the six infected vineyards inspected, it will be noticed that the cuttings in each were obtained from Etiwanda, in San Bernardino County, a district which, at the time of securing these cuttings, was free from disease, but which, in the past eight months, is said to have developed it. Therefore, if such is true, it cannot be positively stated that the disease was not in the cuttings, but lurking in the soil. While in the case of Mr. Nisson, we have positive evidence that the grape cuttings which he secured from San José came from healthy stock; here, apparently, is a case where the "impregnated ground" theory may hold good. The vineyard of Mrs. Blaisdell contains cuttings obtained from Elsinore. In this district, I have been lately told, exists a disease almost identical in its most visible features with the Anaheim disease, differing from that, however, in this essential: that the plant does not die from it.

I might add an experience, which has come under my personal observation, in the Sunny Slope vineyards located in the San Gabriel Valley: During the height of the disease in this vineyard, a large plot of Mataro vines had every appearance, as far as outward signs would indicate, of a very severe attack of the Anaheim disease, so much so that it was considered los; but contrary to all expectations, the following year the vines made some new growth of better color than usually made by diseased vines; this continued to increase as the season advanced. I have watched this particular plot—as I have been in a position to do so—with a great deal of interest, and can state that to-day there is not a healthier lot of vines of that variety in the valley. The fruit this year was perfect in shape, full grown, and sweet, and a good crop was produced. None of the so-called patent remedies of any kind were used to bring this result about, only good cultivation and irrigation were given,

and the balance was accomplished by nature. This is a very rare case; in fact, it is the only one known to me where the disease acted in this most peculiar way. The usual result to an attacked vine was death.

It therefore seems to me, through the inspection made, that the attack being of such recent date, it will be impossible at this time to positively state that the malady which we diagnosed as the Anaheim disease is such, or something very similar in appearance to it; however, disease is apparent there, but whether it is the fatal Anaheim disease, is a question which time alone can answer. All vineyards inspected were planted with Muscat cuttings.

In the valley in which I reside—the San Gabriel Valley—the fatal Anaheim disease to all appearances has ceased its virulence, attacking very few vines this year which had hitherto been free from it; but in the face of the former symptoms observed in the birthplace of the disease, as above set forth, it would be well for those intending to set out large bodies of vines, to go slowly for the next year, and await development in the infected districts, as it is a question whether the disease has run its final course.

Before closing, I desire to express my thanks to Professor Dowlen, Mr. Wallace, and Professor Pierce for valuable information received and courtesies extended.

Respectfully submitted.

E. C. BICHOWSKY,
Commissioner for the Los Angeles District.

PARTIAL REPORT OF CHARLES A. WETMORE.

Read at the December meeting of the Board, 1893.

NEW YORK, December 3, 1893.

To the Board of State Viticultural Commissioners of California:

GENTLEMEN: While awaiting the final results of examinations of California wines and brandies exhibited at the World's Columbian Exposition, I have devoted some time in New York to the question of the practicability of a wine exhibit here, with café and restaurant facilities. In this latter matter, I believe I have succeeded in securing all that our State could ask for, but the plan is not yet perfected sufficiently for final submission.

THE OLDHAM REPORT.

The report to the British Royal Commission on California wines and brandies, made by Charles F. Oldham, of London, has been printed in full by all the leading wine trade reviews of this country, and will no doubt prove to be the first important step toward unprejudiced critical recognition of the varying merits and improving conditions, as well as the shortcomings of our vintages. As soon as the general wine trade accepts California products, subject to distinctions of quality and vintages, the grower who aims at quality will have a chance to rise in the market above the dead provincial level.

Under the arrangement which was made with the British Royal Commission, the report of Mr. Oldham was to be a public matter, to be followed by the transmission to the Royal Commission in London through him of samples of such wines and brandies as he might select for further and more practically effective examination and demonstration. If "the proof of the pudding is in the eating," the proof of Mr. Oldham's criticisms will be in the future sampling in London.

It was my understanding with Mr. Oldham that samples, in liberal quantities, of all the wines and brandies specially designated in his report, should be collected by the State Viticultural Commission and forwarded at the expense of the State to him. This should be done without any unnecessary delay. The expense of transportation and the British duties will not be a very great item.

There are some directions which will need to be carefully attended to: First, let it be borne in mind as to this shipment, and as to any other that our producers may contemplate, that, under a recent law, the regulations of the British customs service are a Chinese wall against any goods which bear, according to British ideas, a false representation. For instance, Mr. Oldham informed me that a lot of wine shipped in barrels from Santa Clara County was stopped because the word "Burgundy" was on the heads. He was in doubt whether he could get them at all, even after offering to scrape the offending word from the wood.

It is assumed in England that "Burgundy" means a French wine, unless unmistakably described as "California Burgundy," notwithstanding the fact that the real signification of the term in a French sense is very vague. There is no telling what difficulties might arise from the popular mercantile use of general terms, such as "Hock," "Port," "Sherry," "Sauterne," and "Champagne." If the popular term, "Burgundy," causes difficulty, what might happen to a cask marked "Johannisberg," as is common with us in describing wine from the "Johannisberg Riesling"; or a "Tokay"?

Bearing this in mind, it would probably be best to put all samples in new, unstamped boxes, viz.: without proprietary brands; and to label bottles and mark cases with simply the names of exhibitors and distinctive terms after the following fashion: "California, wine from Riesling grapes"; or "from Sauterne grape varieties"; or "of Sauterne type." In all cases indicating the California origin in connection with all use of terms of foreign character. This work, to avoid any trouble, ought to be done by the Commission after the samples are gathered together.

As to the quantities of each kind to be sent, I respectfully suggest not less than a case of each kind; the more the better. The opportunity to get a general distribution, and perhaps repeated samplings in places difficult to approach ordinarily, will be worth all the trouble and expense.

Later I will make some suggestions as to the form of official publication for Mr. Oldham's report and general information properly connected with it.

Perhaps some may not appreciate the importance of simple, candid, unprejudiced, and conservative criticism, such as we have been favored with, and would have been better pleased with more positive laudation. To such let me suggest that the highest compliment will have been paid us, when the wine trade centers of the world think it worth while to ask for similar reports every year, for the practical information of the trade, the fact of distinctions—merits and defects—being assumed, instead of adhering to the old style, dead level classification under the one term "California."

A report on California wines is only a misleading agency, if it assumes to fix any permanent character, or relative value, upon any particular grower's brands. The wine trade of the world will not accept any final report upon distinctions which vary from year to year; nor will it indorse brands as synonymous with fixed qualities, except after long experience, and then only in a very general and elastic sense. The report from Chicago upon our bottled samples of varied, and in many cases unknown years, is a very good starter, and may be the means of establishing a custom for more particular yearly application. When that happens, we may be said to have won distinction and to command attention.

THE TARIFF ON WINES.

The supposition that there would be an attempt to lower the tariff of wines by the Ways and Means Committee in Congress, is now supplanted by the certainty that an attempt will be made to accomplish the same by a treaty with France.

I desire especially to avoid all appearance of volunteering any opinion concerning the attitude our producers should assume toward such a

movement. My present temporary connection with the work of the Commission does not call for opinions or advice in this matter, except that as an individual producer I shall claim that the policy of California must be voiced by the owners of vineyards rather than by the dealers and speculators in wines. The prosperity of the vine grower is the question of paramount importance.

It is, however, of first importance that the vine growers should be kept informed in all matters affecting this movement, which will undoubtedly be openly agitated before Congress convenes after the Christmas holidays.

The French, stimulated by a revival of production of wines and consequent low prices both in France and Algiers, have been diplomatically studying our tariff conditions and endeavoring to get a reduction of the rate on wines during the general revision under the Wilson bill.

This first movement has failed; however it may yet prosper through future amendments remains to be seen.

The pitiable condition of our producers and the low prices obtaining for better wines than France is trying to send us, have given rise to the suggestion of a compromise. In a rough way the plan suggested by the New York importers is outlined in a brief article in the last issue of "Bonfort's Wine and Spirit Circular," viz.: "If our friends in Bordeaux want to do something practical, let them form a syndicate to take five million gallons of California wine per annum for five years, provided the American duty on still wine is reduced to 25 cents per gallon (33 fr. per hecto.). The details can very easily be arranged by appointing—say M. Albert Schyler—to treat with the California State Committee on Viticulture in regard to quality, shipments, etc. If Bordeaux will send him, or anybody like him, we'll guarantee him against Indians, the Cataract of Niagara, and American whisky. He ought to be here by Christmas."

Whoever the Bordeaux people have had here recently appears not to have succeeded, nor to have been wise in his methods. The suggestion voiced through "Bonfort's" has been cabled to Bordeaux, and the result is made partially known by the following news dispatch, which appeared in the New York papers, viz.:

PARIS, Dec. 2.—The Bordeaux Society of Political Economy yesterday decided to ask the French Government to open negotiations with the American Government with a view to concluding a treaty of commerce between the two countries. The society begs the Senators and members of the Chamber of Deputies, representing the Department of the Gironde, to use their influence in behalf of the proposal.

We may assume that the agent of the Bordeaux wine men is on his way to our country, fully empowered to act for a syndicate.

In connection with these movements, the reports of the last vintage in Europe, and the market quotations for new wines, are interesting.

The French vintage for 1893 is estimated at thirteen hundred million gallons. This is about double what it was a few years ago, and almost equal to the average for the ten years prior to 1878.

There appears to be good reason to believe that the phylloxera plague has spent its force, and that it will now succumb to careful management.

The importations into France from Spain have begun to materially diminish. The increase of the French vintages, aided by the inventions which have been introduced during the period of scarcity, such as "second wines," made with cane sugar and pomace, and raisin wines,

makes it possible for the large exporters to think of increasing exportations, especially to those countries, like the United States, which have been educated to the taste of "cargo" wines (*vins de cargaison*).

By reference to "Bonfort's" European correspondence, published the 25th ult., it will be seen that new wines have been sold in all districts at very low prices, because cooperage was lacking.

In the Herault, light grade Aramon wines sold at 10 to 11 francs per hectoliter, or about 8 cents per gallon; superior quality Aramon, at 12 to 13 francs, or about 9½ to 10 cents per gallon; other superior wines, 15 to 17 francs, or 11½ to 12½ cents per gallon.

In Algiers, "good wines of 11 to 12 degrees" of alcohol "are worth from 7 to 10 francs per hectoliter" (7 to 8 cents per gallon), "and distillery wines 70 centimes per degree."

Considerable quantities of fair qualities of 1893 Medoc have been sold for from 25 to 30 cents per gallon.

France could easily use a good quantity of stout California wines, to be blended for re-exportation, thereby saving all duties, but whether she can pay enough to make it profitable to us is the question. Perhaps, as a compromise, she can.

There are several views of this tariff question, which may be taken seriously under consideration, with reference to our future prosperity, but I do not propose to be a volunteer in the coming fight. I leave the subject with a caution to the vine growers to take charge of their own interests.

I will write further concerning the café exhibit for New York in a few days.

CHAS. A. WETMORE.

REPORT OF THE EXECUTIVE COMMITTEE.

Read at the June meeting of the Board, 1893.

SAN FRANCISCO, May 16, 1893.

CHARLES BUNDSCHU, *Esq.*, *Chairman Executive Committee, San Francisco:*

DEAR SIR: At your request I have prepared the following statement of the principal work done by the Executive Committee during the past six months.

At the meeting of March 14th, the committee provided for the Commission's exhibit in the Horticultural Building at Chicago. The exhibit is now in place.

Under the direction of the committee, a pamphlet on viticulture in California has been prepared and is ready for publication.

A canvass of the counties of Sonoma, Santa Clara, Alameda, and Southern California, similar to that undertaken in Napa County, is under way. The Alameda County canvass is now ready for publication.

A conference was held in May with Hon. T. J. Geary, Congressman from the First District of California, as to needed revisions in the customs and internal revenue laws. This study has been made and drafts of laws prepared.

The committee had prepared a plan for a fine display of California wines in the California Building at Chicago. The State World's Fair Commission would not use it. The show is very inadequate, according to all reports.

In legislation the committee has indorsed the State Raisin Packers' Association bill; and the committee has investigated the proposed reciprocity scheme (of Commissioner Shorb) with France; it has also endeavored to get the Internal Revenue Department to issue a special tax-paid stamp for fruit brandy withdrawn from original packages.

The committee has continued the collection of statistics of coast movement of wine, and the Secretary has continued keeping up the statistics as to Eastern and foreign shipments.

By the time the Board meets, the committee will be ready to report on their quarters and the café.

Yours truly,

WINFIELD SCOTT.

REPORTS OF SECRETARY WINFIELD SCOTT.

FIRST REPORT.

SAN FRANCISCO, December 12, 1892.

To the Board of State Viticultural Commissioners:

GENTLEMEN: During the past six months the regular routine work of this office has been conducted as usual, and one or two special investigations ordered by your Executive Committee have been attended to as promptly as possible.

I have spent more time than ever in the collection of statistics. This branch of my work, which is specially enjoined upon me by the Act of 1880, has been systematized to such a point that not only can any desired statistics be obtained at a moment's notice, on the export movements of wine and brandy by sea and rail, but also on the imports of wines and spirits, the production of sweet wines, brandies, etc. I attend personally to this work, as experience has shown that the commercial reports in the daily press are too inaccurate to be depended upon.

The annual report for 1891-2 has been received from the State Printer, and properly distributed.

The special reports of Commissioners Shorb and Bichowsky on the Anaheim disease have been printed and properly distributed.

Your Executive Committee has authorized the preparation and publication of a pamphlet on the manufacture of grape syrup. This would have been issued by this time had I not been delayed by the Yaryan Machine Co., of Toledo, Ohio, which is preparing the cuts, etc., for the vacuum process. I am also informed that Messrs. Sanders & Co., of San Francisco, have invented a machine for making syrup by the vacuum pan process. I have myself investigated the open tub and pan processes in use at Cloverdale, Woodland, and elsewhere, and have received valuable assistance from the Western Sugar Refinery Company. My own part of the work is done, and I am now awaiting the reports from the Yaryan Co. and Sanders & Co., before sending the pamphlet to the State Printer. From present appearances there is not much prospect of issuing this pamphlet until after the Legislature adjourns, which will not be until March 1, 1893. This will, however, be in ample time for the purpose.

I am now tabulating, and preparing for publication in a separate pamphlet, the vineyard statistics of Napa County, prepared under direction of Commissioner Priber, at the instance of the Executive Committee. It will not require over two days to prepare the returns from these districts for the printer, and I expect to have the Napa Valley report with the State Printer by the end of this week. It must be published before the end of the month, to accomplish what is desired.

I have been actively engaged during the past month in watching the development of the attack on the Sweet Wine bill coming from New York. I have done much personal work, both with the members of the

present Congress and with the members elect, posting them on the points at issue. This has required time, and has been a matter of expense as well. I would recommend that some steps be taken to secure active and competent representation in Washington, should it appear that the movement to pass the Raines amendment becomes dangerous. It is apparent that nothing but constant watchfulness can preserve the law as it stands.

During the past six months much of the routine work of the office has been ably and well performed by Miss J. C. Davis, whose employment the Executive Committee authorized. The work has grown so that I am unable to attend to it all myself, and the assistance has been very welcome.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

SECOND REPORT.

SAN FRANCISCO, June 12, 1893.

To the Board of State Viticultural Commissioners:

GENTLEMEN: During the past six months the ordinary business incident to this office has been transacted with the usual promptness. The collection of statistics, the correspondence, the scrap-books, and the distribution of reports have been a source of constant work, in which I have been ably assisted by Miss Davis.

Much of my time has been occupied in carrying out the instructions of the Executive Committee, which have brought about more work than has been the case for some years.

At their suggestion I have prepared a study of the changes in the internal revenue and tariff laws needed by the industry. This has occupied over six weeks, in which time I have received advice not only from the brandy makers and merchants of California, but also from the American Distillers Association, of which I am Advisory Committee from California. I may say here, that the officers of this association desire me to attend a conference on these laws at an early date in Louisville. For various reasons they desire that these laws, all favorable to them and to us, shall emanate from California.

I have made a study of the possibilities of reciprocal trade with France, with results already known to you.

I have prepared copy for a sixty-page pamphlet on California viticulture, for distribution at Chicago.

The work on grape syrup has been received and distributed, as has also the report on the condition of the vineyards in Napa County. The matter for a similar report on the vineyards of Alameda County is ready for publication, and I am informed that the canvass of Sonoma County on similar lines is about finished.

I would suggest that the Board at once prepare a treatise on the handling of bulk wines in small quantities, and on bottling, for distribution among Eastern and other buyers.

Yours,

WINFIELD SCOTT,
Secretary.

THIRD REPORT.

San Francisco, December 11, 1893.

To the Board of State Viticultural Commissioners:

Gentlemen: Immediately after your last semi-annual meeting in June, at which I was instructed to proceed to Louisville, Cincinnati, and other points, and arrange for united action on certain desired national legislation, I proceeded direct to Louisville on the mission intrusted to me.

Arriving at that city I soon met Mr. J. B. Wathen, the President of the American Distillers and Wholesale Liquor Dealers Association. He at once called two meetings: one of the Directors of the association, and the other of the distillers at large.

The desired measures affecting the internal revenue, prepared by me, were submitted at both of these meetings. After many hours spent in discussion, they were amended in one or two particulars, and approved.

I also visited Owensboro and Cincinnati to ascertain the views of the distillers and distillers' agents clustered at those places, and then deeming my mission closed, returned to California.

As soon as I was back I prepared new drafts of all the laws desired, and a complete study of the tariff as affecting wines. These I prepared for publication in pamphlets by the State Printing Office. The State Board of Examiners, however, would not permit their publication at the State office, holding that the province of the Board did not extend to attending to matters pertaining to legislation. It was in vain that I made two trips to Sacramento to reason with the gentlemen; nor would they permit the studies to be published out of the appropriation of this Board and not out of that of the State Printing Office.

From conversation with private persons in San Francisco who profess to know, it would seem that an attempt is to be made to repeal the Sweet Wine Law. This bill has been reintroduced in Congress exactly in the shape as passed by the last Congress as a portion of the McKinley bill.

I have had an active part in approving the proposed internal revenue tax on wine, and am assured from Washington that the idea is dead.

There is one point on which this Board should take action, and that is in reference to the proposed tariff on brandy and all spirits. The tariff at present, as is well known, is $2 50 per proof gallon. The Wilson bill proposes to put it at $1 80 per proof gallon, and at the same time it is considered almost a moral certainty that Congress will raise the internal revenue tax on distilled spirits to either $1, $1 10, $1 25, or even $1 50 per proof gallon. These two circumstances will place our brandy industry in a most precarious state—far more so than exists at present—and will certainly encourage the importation of beet-spirit brandies from France. It seems to me that active work is needed here at once.

Casting aside matters pertaining to legislation, I will conclude this report by saying that in the past six months my time has been constantly employed, either as above stated or in attending to other duties.

The reports of the census of Alameda County have been compiled and published.

The Sonoma County census has been compiled and published.

The Southern California census has been compiled and is in type at the State Printing Office.

All of the statistics of exports and imports have been carefully kept up, and I can at a moment's notice give any desired statistics for years back, on any point on which such information can possibly be desired.

The correspondence has been maintained as usual.

In all my work I have had the invaluable assistance of Miss Davis.

Respectfully submitted.

WINFIELD SCOTT,
Secretary.

FOURTH REPORT.

SAN FRANCISCO, June 11, 1894.

To the Board of State Viticultural Commissioners:

GENTLEMEN: My report at this meeting will not be one of any great extent. During the past six months the routine business of the Board coming through my office has been disposed of as it arose. The scrap-books are being kept up; the statistics of exports of wine and other liquors are maintained, and the business of the office is in good shape.

Good headway is being made in the preparation of the annual report to be given to the State Printer soon. Aside from the regular reports of officers in this report, arrangements have been made with the proper authorities for a description of the Viticultural Palace at the Midwinter Fair, to which this Board contributed largely. Another feature will be a paper by Mr. W. J. Parker, agent of the Mexican Central Railway, on the development of a market for California wines and brandies in the central and eastern portions of Mexico, a field heretofore almost entirely neglected, and yet a most promising one from all accounts. Mr. C. A. Wetmore will contribute a paper on vinification and other topics, and another appendix will be a translation of part of Valery Mayet's "Les Insectes de la Vigne," or at any rate that portion of it relating to phylloxera. This work I have been prosecuting at odd intervals, and it will take me some days of steady work to complete the most essential portions.

Very truly yours,

WINFIELD SCOTT,
Secretary.

MINUTES OF THE BOARD.

Minutes of the regular semi-annual meeting of the Board of State Viticultural Commissioners, held at the office, 317 Pine Street, on Monday, December 12, 1892, at 11 o'clock A. M.

Present: President West, Commissioners Bundschu, Shorb, Doyle, Priber, Bichowsky, and De Turk; Chief Executive Officer C. J. Wetmore, and the Secretary. Absent: Commissioners Stephens and Towle.

The minutes of the June meeting were read and approved.

On motion, the reading of the minutes of the Executive Committee was dispensed with.

Commissioner Shorb requested that he be relieved from the Committee on World's Fair. This was granted.

Commissioner Shorb brought up the matter of the expenses incurred in looking after the Anaheim disease. He said that the matter had been a source of constant and considerable expense to him, and that he should be entitled to reasonable recompense as expert when actually engaged. Several Commissioners expressed a similar view. On motion of Commissioner Bundschu, the matter was referred to the Executive Committee with power to act in the premises.

The report* of E. C. Priber, Commissioner for the Napa District, was presented and ordered to print.

The report* of C. J. Wetmore, Chief Executive Officer, was read and ordered placed on file. The report evoked considerable discussion on the question of supplying Riparia cuttings to growers. Commissioner Priber stated that the nurserymen as a rule did not like to handle Riparia, on account of the losses. No further action was taken, however.

The report* of Secretary Scott was read and placed on file.

At the suggestion of Commissioner Shorb the Secretary was instructed to visit the works of the American Concentrated Must Company, at Geyserville, before making his final report.

The following resolutions were unanimously adopted:

Resolved, That this Board has heard, with the deepest regret, of the death of Charles Krug, who was a member of the Commission from the date of its organization in 1880 until 1890, and whose services to the State at large, and to the people of the Napa Valley, in the cause of viticulture, were of great and permanent value.

Resolved, That the Secretary be directed to express to the family of Mr. Krug the sympathy of the Commissioners, and that as a mark of respect to the memory of the deceased these resolutions be spread upon the minutes of the Board.

The question of the opposition of the Commission to the Raines amendment to the Sweet Wine Law was then brought up. The Commissioners were unanimous in the belief that the Raines bill should be defeated.

Commissioner Shorb suggested that inasmuch as he would depart for the East in about three weeks, he could do some work in Washington

* These will be found in the regular reports of officers, printed elsewhere.

against the bill, provided arrangements were made for defraying part of his expenses.

On motion, the matter was referred to the Executive Committee, with power to make suitable arrangements with Commissioner Shorb.

A letter was read from Hugh Frazier, a Bordeaux expert, offering his services to any one requiring them. The letter was ordered filed.

Commissioner Shorb brought up the question of attempting to secure reciprocal arrangements with France, as to wines. He submitted a written statement of what, in his judgment, was required. On motion, the matter was referred to the Executive Committee to investigate the matter, and to take such action as is deemed proper.

Recess was then taken until 2 P. M.

On reassembling, the petition of M. M. Baldwin, for appointment as clerk and storekeeper, with letters of recommendations, was presented. Commissioner Shorb stated that he had to leave the meeting, but desired to record his vote for Mr. Baldwin before going. After some discussion, the matter was referred to the Executive Committee for action.

Chas. A. Wetmore offered a letter stating that he had discovered a process of making new wines bottle bright in a short time. This was, on motion of Mr. Bundschu, referred to the Executive Committee.

The treatment of the viticultural industry by the World's Fair Commissioners of California then came up for a long discussion. It was stated that the small space of 26 by 28 feet had been assigned to viticulture in the California Building. Superintendent of Exhibits, W. H. McNeil, was called upon for a statement of facts, and was questioned by Commissioner Priber and others. The action of the World's Fair Commissioners came in for a round of criticism, and then, on motion of Commissioner Priber, a committee of three was appointed to draft a suitable letter to the World's Fair Commission. The Chair appointed Commissioners Priber, Bundschu, and Bichowsky.

Commissioner Priber made a motion that the Viticultural Commissioners authorize the Executive Committee to spend a sum not exceeding $3,000 in assisting a proper viticultural display. This was seconded and then amended, authorizing the committee to expend any available funds for the purpose. The motion as amended was adopted.

The Commissioners then adjourned.

WINFIELD SCOTT,
Secretary.

Minutes of the regular meeting of the Board of State Viticultural Commissioners, held on Monday, June 12, 1893, at 11 A. M., at 317 Pine Street.

Present: President George West, and Commissioners Bundschu, De Turk, Priber, Bichowsky, and Towle, also C. J. Wetmore and the Secretary. Commissioners Doyle, Shorb, and Stephens were absent.

The minutes of the December meeting were read and approved.

The minutes of the meetings of the Executive Committee since December, 1892, were read, and the action of the committee approved.

Commissioner Bundschu presented a report on behalf of the Executive Committee, which was read and placed on file.

Commissioner Bundschu presented a complete report on the condition

of the vineyards of Alameda County, prepared by Frank L. Fowler. The report was read and passed to print.

On motion of Commissioner Bundschu, a vote of thanks was extended to Messrs. F. L. Fowler and William Palmtag for services rendered at Sacramento during the recent Legislature.

Chief Executive Officer Wetmore made a verbal report of his work in Chicago at the World's Fair in setting up the Commission's exhibit, and aiding others, at the same time stating that he would file a written report later.

The report of Secretary Scott was read and placed on file.

On motion of Commissioner Priber, a vote of thanks was unanimously tendered William Forsythe, for his able and successful efforts in behalf of the California wine growers in Chicago.

The matter of printing a pamphlet on viticulture in California for distribution at Chicago was then taken up. On motion, the Chief Executive Officer, the Executive Committee, and the Secretary were instructed to proceed with the work with all possible expedition.

Commissioner De Turk reported that the canvass of Sonoma County for statistics of viticulture was about completed.

Commissioner Bichowsky stated that with the appropriation allowed him—$400—for the canvass of San Bernardino, Orange, and Los Angeles Counties, he could probably include San Diego County. He was authorized to do so.

Commissioner Priber then moved that when the lease of the present quarters at 317 Pine Street expires, July 1, 1893, the Commission move into other offices. This was unanimously carried.

Recess was then taken to 2 P. M.

During the recess the Commissioners visited the proposed new quarters over the First National Bank, at Bush and Sansome Streets.

On reassembling Commissioner Priber moved that the suite of rooms on the second floor of the First National Bank building, immediately over the bank, be leased for two years from July 1, 1893, at a monthly rental of $150 per month. Carried.

The equipment of the rooms was, on motion of Commissioner Priber, left to the Executive Committee.

A communication from F. L. Fowler, regarding the proposition of Colonel H. Bendel to combine the producers and thus raise the price of wines, and further suggesting that a thorough personal canvass of the Eastern markets be made, was read and filed.

The Secretary was instructed to inform all viticultural societies and all concerned that the rooms of the Board were open to all who desired to use them for meetings, etc.

Secretary Scott submitted a study of the proposed changes in the internal revenue and customs laws.

On motion of Commissioner Priber, Mr. Scott was instructed to go to Louisville and other distilling centers and confer with the officers of the American Distillers and Wholesale Liquor Dealers Association, and to return if practicable in a month.

The communication of Allen B. Lemmon, asking for the cuts of grape syrup pamphlet, on loan, was referred to Mr. De Turk for action.

Election of officers was then declared in order.

For President, John T. Doyle was nominated by Commissioner De Turk. Mr. West was also nominated, but withdrew. A ballot was

taken, which resulted: John T. Doyle, 4; blank, 1. Mr. Doyle was declared elected.

For Vice-President, Charles Bundschu was nominated. There being no other nominations, the rules were suspended and the Secretary was instructed to cast the unanimous vote of the Commissioners for Mr. Bundschu.

For Treasurer, Allen Towle was nominated. There being no other nominations, the rules were suspended and the Secretary was instructed to cast the unanimous vote of the Commissioners for Mr. Towle.

For Secretary, Winfield Scott was nominated. There being no other nominations, the rules were suspended and Mr. Bundschu was instructed to cast the unanimous vote of the Board for Mr. Scott.

For Chief Executive Officer, Mr. C. J. Wetmore was nominated. There being no other nominations, the rules were suspended and the Secretary was instructed to cast the unanimous vote of the Commissioners for Mr. Wetmore.

Adjourned.

WINFIELD SCOTT,
Secretary.

President Doyle communicated the following:

SAN FRANCISCO, June 24, 1893.

To CLARENCE J. WETMORE:

DEAR SIR: I shall have to ask you to act as Secretary *pro tem.* of the Commission during Mr. Scott's absence from the State.

I have made the following appointments of committees for the ensuing year, which you will please communicate to the several gentlemen named, without delay.

Committee on Finance.—Commissioners Towle, Stephens, and Priber.
Committee on Vine Pests.—Commissioners Bundschu, Priber, and West.
Committee on Distillation.—Commissioners Priber, Shorb, and Stephens.
Committee on Table Grapes.—Commissioners Stephens, Towle, and Bundschu.
Committee on Experimental Cellars.—Commissioners Bichowsky, Bundschu, and Shorb,
Committee on Anaheim Disease.—Commissioners Shorb and Bichowsky.
Executive Committee.—Commissioners West, De Turk, and Bichowsky.
Auditing Committee.—Commissioner De Turk.

Yours respectfully,

JOHN T. DOYLE,
President.

Minutes of the meeting of the Board of State Viticultural Commissioners, held at the office, 101 Sansome Street, on Monday, December 11, 1893, at 11 o'clock A. M.

Present: Commissioners Bundschu, De Turk, West, Bichowsky, and Stephens.

President Doyle being absent, Vice-President Bundschu declined to take the chair, and Mr. West moved that Mr. Priber act as Chairman. Carried.

The minutes of the last meeting (June, 1893) were read and approved.

The minutes of the meetings of the Executive Committee since June were read and approved.

Reports of officers were called for.

The report of C. J. Wetmore, Chief Executive Officer, was read and filed.

The report of Secretary Scott was read and filed.

The report of Chas. A. Wetmore, who went to Chicago on a special mission, was read and filed.

The open letter of Charles E. Bowen, in reference to the sale of wines at the Midwinter Fair grounds, was read. After some discussion the letter was, on motion, referred to the meeting of wine men, to be held this afternoon.

On motion of Mr. Stephens, a committee of two was authorized to call on the Midwinter Fair authorities with reference to securing some means for the sampling of all wines on the grounds.

The Chair appointed Messrs. Bundschu and De Turk.

Mr. Bundschu offered the following resolution, which was unanimously adopted:

Resolved, That it is the sense of the Board of State Viticultural Commissioners that the Executive Committee of the Midwinter Fair be urged to use special efforts to secure an impartial and intelligent representation of California wines at the Midwinter Fair in all such places where concessions have been, or will be, granted to sell such wines to visitors; and that no discrimination to the detriment of our products shall take place.

Carried.

The matter of the proposed reduction in the duties on brandy and raisins was brought up. After considerable discussion, the Secretary and Chief Executive Officer were instructed to draw up a protest against such reductions and to report at the afternoon session.

The Secretary was granted a leave of absence of about two weeks, beginning December 27th.

Recess was then taken until 2 P. M.

On reassembling, the Secretary and Chief Executive Officer were not yet ready to report in the matter of the protest against reduction of duties, and the question was left to these officers for action immediately.

Mr. J. J. Jacobi appeared before the Board in reference to the reduction of duties, and also in regard to the internal revenue tax on wine, which was threatened.

On motion, the matter was also referred to the Chief Executive Officer and Secretary, to draw up resolutions to the Pacific Coast delegation, warning them against the proposed tax.

Adjourned.

ACTION OF THE BOARD.

WHEREAS, It is proposed by the Committee on Ways and Means of the House of Representatives of the United States to reduce the import tariff on raisins from 2¼ cents to 1½ cents per pound; and whereas, such action would cause the uprooting of many thousands of acres of raisin grapes in various portions of this State, and would cause the resultant financial ruin of a large proportion of people who have embarked their possessions in this branch of viticultural industry; be it

Resolved, By the Board of State Viticultural Commissioners of California, acting on behalf of the raisin growers and packers, That we protest in unmeasured terms against such proposed action, considering that at the present time and under equitable tariff conditions, it is in none too flourishing a state, and needs fostering rather than discouragement.

Resolved, That these resolutions be sent to the Pacific Coast delegation in Congress and to the press.

WHEREAS, It is reported that the Ways and Means Committee of the House of Representatives of the United States will recommend that the tariff on brandy and distilled spirits imported into the United States be reduced from the present rate of $2 50 per proof gallon to $1 80 per proof gallon; be it

Resolved, That the Board of State Viticultural Commissioners, as representatives of the viticultural interests of California, protests most strenuously against such reduction; that any lessening will stimulate the importation of foreign compounded brandies in which beet and potato spirits enter largely, to the detriment of the health of the peo-

ple; that the reduction will not in any manner stimulate the importation of the better grade of goods.

Resolved, That if, as is now threatened, the internal revenue tax on brandy and all distilled spirits is raised from 90 cents per proof gallon, the margin between the domestic tax and the import tariff will be so small as to discourage domestic producers, and will inevitably result in decreased domestic production.

Resolved, That these resolutions be sent to the Pacific Coast delegation in Congress and to the press.

WINFIELD SCOTT,
Secretary.

SAN FRANCISCO, June 11, 1894.

A meeting of the Board of State Viticultural Commissioners was held this day at 11 A. M. at 101 Sansome Street.

Present: President Doyle, and Commissioners De Turk, West, Crabb, and Towle, also Chief Executive Officer Wetmore and the Secretary.

The minutes of the December, 1893, meeting were read, amended, and approved.

The minutes of the meetings of the Executive Committee since the December meeting were read.

The report of C. J. Wetmore, Chief Executive Officer, was read, and, on motion, was placed on file.

The report of Commissioner H. W. Crabb, of the Napa District, was read and placed on file.

The report of Secretary Scott was read and placed on file.

Letters were read from A. H. Brown, of Riverside, who had been arrested and fined in Riverside County for selling wine from his winery. The Secretary was, after some discussion, instructed to write to Mr. Brown for a copy of the record in his case.

Mr. Wetmore made a report on the plan now being formulated to secure better prices for grapes and wines by the formation of a syndicate. After a long discussion the following resolutions, offered by Mr. West, were adopted:

Resolved, That the proposal of the committee of wine growers, now communicated by Mr. C. J. Wetmore, if carried out, is, in our opinion, well calculated to obtain the object proposed; and if successful will be of the highest benefit to the viticultural interests of the State.

Resolved, That the Chief Viticultural Officer be directed to devote himself at once to the carrying out of this project, and for that purpose to call meetings in the various viticultural districts or counties, which he will attend in person or by deputy appointed by him, and urge the scheme upon the wine growers generally; and that he be authorized to print a sufficient number of blank contract forms, after approval as to their form by the President of this Commission and by the Chairman of the Executive Committee, who are authorized to take professional advice on the subject.

Resolved, That $500, payable out of the appropriation for the forty-sixth fiscal year, be appropriated for the expenses of the work, to be accounted for by the Chief Executive Officer.

Election of officers was then declared in order, and ballots for President were taken.

For President, John T. Doyle received four votes, and one was blank. Mr. Doyle was declared elected.

For Vice-President, E. C. Bichowsky received four votes, and Charles Bundschu one vote. Mr. Bichowsky was declared elected.

For Treasurer, H. W. Crabb received four votes, and one vote was blank. Mr. Crabb was declared elected.

For Secretary, Winfield Scott received five votes, and was declared elected.

For Chief Executive Officer, C. J. Wetmore received five votes, and was declared elected.

The death of R. B. Blowers, a member of the first Board, was announced. Mr. West was appointed to draft resolutions, and submitted the following, which were adopted:

Resolved, That this Board has heard, with the utmost regret, of the death of R. B. Blowers, who was identified with the Commission from its inception, in 1880, and who has contributed greatly to the development of viticulture and of raisin making in the State.

Resolved, That we tender the family of the deceased our condolence, and that this resolution be spread upon the minutes.

After an informal discussion of the café project for the Eastern cities, the Board adjourned.

WINFIELD SCOTT,
Secretary.

NEW SWEET WINE LAW.

At the request of numerous sweet wine makers, the Sweet Wine Law, as amended by the recently passed tariff and revenue law, is given herewith:

SWEET WINE LAW.

SECTION 42. That any producer of sweet wine, who is also a distiller, authorized to separate from fermented grape juice, under Internal Revenue laws, wine spirits, may use, free of tax, in the preparation of such sweet wines, under such regulations and after the filing of such notices and bonds, together with the keeping of such records and the rendition of such reports as to materials and products, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may prescribe, so much of such wine spirits so separated by him as may be necessary for the preservation of the saccharine matter contained therein; *provided*, that the wine spirits so used free of tax shall not be in excess of the amount required to introduce into such sweet wines an alcoholic strength equal to fourteen per centum of the volume of such wines after such use; *provided further*, that such wine containing, after such fortification, more than twenty-four per centum of alcohol, as defined by section three thousand two hundred and forty-nine of the Revised Statutes, shall be forfeited to the United States; *provided further*, that such use of wine spirits free from tax shall be confined to the months of August, September, October, November, December, January, February, March, and April of each year. The Commissioner of Internal Revenue, in determining the liability of any distiller of fermented grape juice to assessment under section three thousand three hundred and nine of the Revised Statutes, is authorized to allow such distiller credit in his computation for the wine spirits used by him in preparing sweet wine under the provisions of this section.

SEC. 43. [As amended by the new tariff and revenue bill of 1894.] That section forty-three of the Act approved October first, eighteen hundred and ninety, entitled "An Act to reduce the revenue and equalize duties on imports and for other purposes," be amended so as to read as follows: "*That the wine spirits mentioned in section forty-two of this Act is the product resulting from the distillation of fermented grape juice, and shall be held to include the product commonly known as grape brandy; and the pure sweet wine which may be fortified free of tax, as provided in said section, is fermented grape juice only, and shall contain no other substance, of any kind whatever, introduced before, at the time of, or after fermentation, and such sweet wine shall not contain less than four per centum of saccharine matter, which saccharine strength may be determined by testing with Balling's saccharometer, or must scale, such sweet wine, after the evaporation of the spirit contained therein, and restoring the sample tested to original volume by addition of water;* provided, *that the addition of pure boiled or condensed grape must, or pure crystallized cane or beet sugar,*

to the pure grape juice aforesaid, or the fermented product of such grape juice prior to the fortification provided for by this Act, for the sole purpose of perfecting sweet wines according to commercial standard, shall not be excluded by the definition of pure sweet wine aforesaid; provided further, *that the cane or beet sugar so used shall not be in excess of ten per centum of the weight of the wines to be fortified under this Act.*"

SEC. 43. [In its original form.] That the wine spirits mentioned in section forty-two of this Act is the product resulting from the distillation of fermented grape juice, and shall be held to include the product commonly known as grape brandy; and the pure sweet wine which may be fortified free of tax as provided in said section, is fermented grape juice only, and shall contain no other substance of any kind whatever introduced before, at the time of, or after fermentation, and such sweet wine shall contain not less than four per centum of saccharine matter, which saccharine strength may be determined by testing with Balling's saccharometer, or must scale, such sweet wine after the evaporation of the spirits contained therein, and restoring the sample tested to original volume by addition of water.

SEC. 44. That any person who shall use wine spirits as defined by section forty-three of this Act, or other spirits on which the Internal Revenue tax has not been paid, otherwise than within the limitations set forth in section forty-three of this Act, and in accordance with the regulations made pursuant to this Act, shall be liable to a penalty of double the amount of the tax on the wine spirits or other spirits so unlawfully used. Whenever it is impracticable in any case to ascertain the quantity of wine spirits or other spirits that have been used in violation of this Act in mixtures with any wines, all alcohol contained in such unlawful mixtures of wine with wine spirits or other spirits in excess of ten per centum shall be held to be unlawfully used; *provided, however,* that if water has been added to such unlawful mixtures either before, at the time of, or after such unlawful use of wine spirits or other spirits, all the alcohol contained therein shall be considered to have been unlawfully used. In reference to alcoholic strength of wines and mixtures of wines with spirits in this Act, the measurement is intended to be according to volume and not according to weight.

SEC. 45. That under such regulations and official supervision, and upon the execution of such entries and the giving of such bonds, bills of lading, and other security as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, any producer of pure sweet wine, as defined by this Act, may withdraw wine spirits from any special bonded warehouse free of tax, in original packages, in any quantity not less than eighty wine gallons, and may use so much of the same as may be required by him, under such regulations, and after the filing of such notices and bonds, and the keeping of such records, and the rendition of such reports as to the materials and products and the disposition of the same, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, in fortifying the sweet wine made by him, and for no other purpose, in accordance with the limitations and provisions as to uses, amount to be used, and the period for using the same, set forth in section forty-two of this Act; and the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, is authorized, whenever he shall deem it necessary for the prevention of violations of this law, to prescribe that wine spirits withdrawn under this section shall not be used to fortify wines except at a certain distance, prescribed by him, from the distillery, rectifying-house, winery, or other establishment used for pro-

ducing or storing distilled spirits, or for making or storing wines other than wines which are so fortified, and that in the building in which such fortification of wines is practiced no wines or spirits other than those permitted by his regulation shall be stored. The use of wine spirits free of tax for the fortification of sweet wines under this Act shall be begun and completed at the vineyard of the wine grower where the grapes are crushed and the grape juice is expressed and fermented, such use to be under the immediate supervision of an officer of Internal Revenue, who shall make returns describing the kinds and qualities of wine so fortified, and shall affix such stamps and seals to the packages containing such wines as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury; and the Commissioner of Internal Revenue shall provide by regulations the time within which wines so fortified with the wine spirits so withdrawn may be subject to inspection, and for accounting for the use of such wine spirits, and for re-warehousing, or for payment of the tax on any portion of such wine spirits which remain not used in fortifying pure sweet wines.

SEC. 46. That wine spirits may be withdrawn from special bonded warehouses at the instance of any person desiring to use the same to fortify any wines in accordance with commercial demands of foreign markets, when such wines are intended for exportation, without the payment of tax on the amount of wine spirits used in such fortification, under such regulations, and after making such entries, and executing and filing, with the Collector in the district from which the removal is to be made, such bonds and bills of lading, and giving such other additional security to prevent the use of such wine spirits free of tax otherwise than in the fortification of wine intended for exportation and for the due exportation of the wines so fortified, as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury; and all of the provisions of law governing the exportation of distilled spirits free of tax, so far as applicable, shall apply to the withdrawal and use of wine spirits and the exportation of the same in accordance with this section; and the Commissioner of Internal Revenue is authorized, subject to the approval of the Secretary of the Treasury, to prescribe that spirits intended for the fortification of wines under this section shall not be introduced into such wines except under the immediate supervision of an officer of Internal Revenue, who shall make returns describing the kinds and quantities of wines so fortified, and shall affix such stamps and seals to the packages containing such wines as may be prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury. Whenever such wine spirits are withdrawn, as provided herein, for the fortification of wines intended for exportation by sea, they shall be introduced into such wines only after removal from storage and arrival alongside of the vessel which is to transport the same; and whenever transportation of such wines is to be effected by land carriage, the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe such regulations as to sealing packages and vehicles containing the same, and as to the supervision of transportation from the point of departure, which point shall be determined as the place from which such wine spirits may be introduced into such wines, to the point of destination, as may be necessary to insure the due exportation of such fortified wines.

SEC. 47. That all provisions of law relating to the reimportation of any goods of domestic growth or manufacture which were originally liable to an Internal Revenue tax, shall be, as far as applicable, enforced against any domestic wines sought to be reimported, and duty shall be levied and collected upon the same when reimported, as an original importation.

SEC. 48. That any person using wine spirits or other spirits which have not been tax paid, in fortifying wine otherwise than as provided for in this Act, shall be guilty of a misdemeanor, and shall, on conviction thereof, be punished for each offense by a fine of not more than two thousand dollars, and for every offense other than the first, also by imprisonment for not more than one year.

SEC. 49. That wine spirits used in fortifying wines may be recovered from such wine only on the premises of a duly authorized grape brandy distiller, and for the purpose of such recovery, wine so fortified may be received as material on the premises of such a distiller, on a special permit of the Collector of Internal Revenue in whose district the distillery is located; and the distiller will be held to pay the tax on a product from such wines as will include both the alcoholic strength therein by the fermentation of the grape juice and that obtained from the added distilled spirits.

APPENDICES.

[APPENDICES A AND B ARE BOUND SEPARATELY.]

PLATE I.—EXTERIOR OF VITICULTURAL PALACE.

[Published by permission of Taber, photographer, San Francisco.]

APPENDIX C.

THE MIDWINTER FAIR DISPLAY.

[With five illustrations. Published by permission of Taber, photographer, San Francisco.]

CONTENTS.

MIDWINTER FAIR DISPLAY.

THE COMMISSION'S WORK.

The State Board of Examiners, having consented to the expenditure of a portion of the appropriation of the Board of State Viticultural Commissioners toward making an elaborate and harmonious display of vineyard products at the Midwinter International Exposition, held at San Francisco in the first half of the year 1894, it is but right and proper that a full report of the proceedings in that connection be embodied in this report of the Board.

By vote of the exhibitors, the members of the Board were made members of the Executive Committee of Viticultural Exhibitors. One of the members of the Board, Commissioner I. De Turk, was Chairman of this Committee; another, Commissioner Charles Bundschu, was Chairman of the Building Committee, and on his shoulders fell much of the work in hand. The Secretary of the Board was also Secretary of the Exhibitors, and the Chief Executive Officer, as well as the other Commissioners, not only gave their time to the work in hand, but contributed largely out of their private funds to the work. The office of the Viticultural Exhibitors was permanently located in the office of the Board, at 101 Sansome Street, San Francisco, and all meetings were held there.

The Executive Committee of the Exhibitors was made up as follows:

I. De Turk, *President.*	Hans H. Kohler.	John T. Doyle.
Clarence J. Wetmore, *Vice-President.*	H. W. Crabb.	J. DeBarth Shorb.
Winfield Scott, *Secretary.*	Allen Towle.	C. Carpy.
Charles Bundschu, *Treasurer.*	George West.	Henry Epstein.
Tiburcio Parrott.	P. C. Rossi.	F. Beringer.
William Wehner.	A. Repsold.	E. C. Bichowsky.
F. Korbel.	E. C. Priber.	R. D. Stephens.

THE BUILDING.

The building, usually designated as the "Viticultural Palace," was a splendid structure of staff, surmounted by a circular dome. In size it was 50 by 75 feet, and was located immediately to the west of the north wing of the Main Horticultural Building, with which it was connected by a stairway. The principal entrance opened to the north and led to the pathways to the Southern California Building and the Santa Barbara pyramid.

The main entrance was through the end of a great wine oval, and once within, the visitor was ushered into what was without doubt the most harmonious and effective exhibit of wines and brandies ever made in California or in any other Exposition. The principal exhibition room was about 50 by 50 feet in size, and here the products of some fifty-two wine makers and merchants were displayed. Mr. H. M. La

Rue, who was Chief of Viticulture at Chicago, was loud in his regrets that California did not make such a comprehensive show at the great World's Fair.

In the center was a great piece in the shape of a ten-sided polygon, surmounted by plaster casts of Bacchus and Mercury, seated on a globe of plaster. In the center of the polygon was an office, in which Mr. J. R. Baker made his headquarters, while surrounding the whole were booths in which the members of the San Francisco Wine Dealers' Association had their displays.

Reference to the plan of exhibits will show the location of different county exhibits grouped together. These were unusually tasty and were arranged in alcoves.

Within the Weinstübe, which was located just south of the main exposition room, were numerous tables and chairs devoted to the use of those who desired to taste wines. At the west end of the Weinstübe were placed two great oak casks. One of these bore the inscription:

"What is it to us if taxes rise or fall?
Thanks to our Fortunes, we soon pay none at all."—*Churchill.*

WINE GROWERS OF CALIFORNIA.

Sunbeams condensed from Nature's holy shrine
Are gently housed in every drop of wine.

Back of these casks was a painting showing in perspective the interior of a wine cellar.

On the east side of the Weinstübe was a painting of San Francisco and vicinity, furnished by the San Francisco Wine Dealers' Association. The south side of the Weinstübe was lighted by stained-glass windows.

The decorations of the entire Viticultural Palace were of staff, and all the pillars and rafters were covered with vines and bunches of grapes.

Among the chief features of the decorations were the verses and mottoes which were painted on the interior, all being well selected and to the point. These inscriptions were found both in the main exhibition room and in the Weinstübe. Those in the main room were as follows:

Welcome the coming guest—
The wine will do the rest.

Wer nicht liebt Wein, Weib und Gesang,
Der bleibt ein Narr sein Leben lang.

Champagne! Le Vin des Roi, le Roi des Vins.

Good wine maketh good blood;
Good blood maketh good thoughts;
Good thoughts bring forth good works;
Good works carry a man to heaven.
Ergo,
Good wine carrieth a man to heaven.

Wine that maketh glad the heart of man.

Viva Baccho che cent anni
Ca compare senz affani.

Drink to-day and drown all sorrow;
You may not do it to-morrow.

Hail! Bacchus, Hail!
Thy reign can never fail!

Good wine is a good familiar
Creature, if it be well used.

El Vino que es bueno
No ha menester pregonero.

Ne continue pas a ne boire que de l'eau; mais use d'un peu de vin, a cause de ton estomac et de tes frequentes indispositions.

PLATE II.—LOWER PORTION OF CENTER PIECE.

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Those in the Weinstübe were as follows:

Good company,
Good wine,
Good welcome,
Can make good people.

Die Weise guter Zecher ist,
In frueh und spæter Stunde;
Das alter Wein ein Becher ist,
Und neuer Witz im munde.

Viva quest' attanio divin liquor
Che lieto m'erceta estra d'amor.

Hail, California, glory to thee!
Nature's great wonder, noble and free.

Let us have wine, mirth, and laughter,
Sermons and soda water the day after.

To be, or not to be; that is the question —
Sit down, my friend, and drink; it helps digestion.

A general welcome from His grace.
Old Bacchus salutes ye all!

Some hae wine that canna drink,
And some would drink that want it;
But we hae wine and we can drink,
Sae let the Laird be thankit.—*After Burns.*

Blest be that spot where cheerful guests assemble.

Wine makes Love forget its cares.

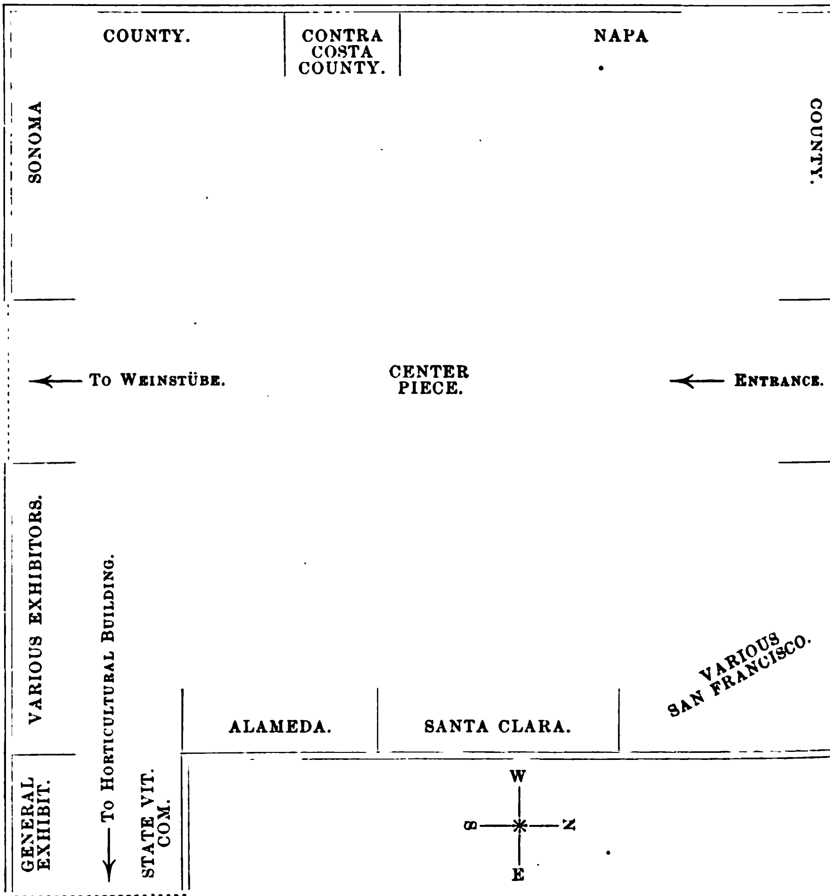
Too much you may touch;
But never enough—
If good be the stuff!

Why, 'tis as it should be! Here, amidst bright eyes and faces; here, sorrow cannot reach.

El Vino dice la verdad
Por que no trae bragas,
Ni depano, ni de lino.

Au matin bois le vin blanc,
Le rouge au soir pour le sang,
Mais au milieu du jour,
Buvez toujours.

PLAN OF VITICULTURAL PALACE.



Center Piece.

Napa Valley Wine Company.
J. Gundlach & Co.
C. Schilling & Co.
Arpad Haraszthy & Co.
B. Dreyfus & Co.
Kohler & Frohling.
Kohler & Van Bergen.
Lachman & Jacobi.
S. Lachman Company.
C. Carpy & Co.

Various, San Francisco.

A. Repsold & Co.
Lenormand Bros.
Cal. Wine Growers' Union.
Justinian Caire.
Sanders' Stills.
Woodin & Little.
Abramson-Heunisch Co.

Sonoma County.

F. Korbel & Bro.
Italian-Swiss Colony.
I. De Turk.
Fulton Winery Company.
Dresel & Co.
Sebastopol Winery Company.
J. Chauvet.
Fountaingrove Vineyard Co.
B. W. Paxton.
J. O'B. Gunn.
E. Schirmer.

Napa County.

M. M. Estee.
Martin Sachs.
J. A. Stanly.
Geo. Schoenwald.
Edge Hill Vineyard Company.
Jacob Schram.
Beringer Bros.
Inglenook Vineyard.
Otto Normann.
Tiburcio Parrott.
Ewer & Atkinson.
Kortum & Fuelscher.
Henry Hagen.
A. Grimm & Co.
A. Brun & Co.
G. F. Chevalier.
H. W. Crabb.

Santa Clara County.

William Wehner.
Los Gatos and Saratoga Wine Co.
Paul Masson.
E. E. Goodrich.
C. A. Baldwin.
J. C. Merithew.
Los Gatos Coöperative Winery.
Saratoga Wine Company.
A. R. Scott.

Alameda County.

J. L. Beard.
J. W. Stanford.
Chauche & Bon.
C. A. Wetmore.
H. B. Wagoner.
Jno. Crellin & Sons.

Contra Costa County.

B. H. Upham.
Mt. Diablo Wine Company.
Jos. Naphthaly.

Various Exhibitors.

Ben Lomond Wine Co., Santa Cruz.
Wm. Palmtag, Hollister.
H. R. Schell, Knight's Ferry.
Natoma Vineyard Company, Natoma.
Geo. West & Son, Stockton.
Eggers' Vineyard Company, Fresno.
Fresno Vineyard Company, Fresno.

CEREMONIES AT THE OPENING.

Amid great applause and the clinking of glasses, the Viticultural Palace at the Midwinter Fair was formally opened on April 7th, and while the crowd present was not large, it was thoroughly representative. The guests of the occasion were seated at tables with glasses of sparkling wine before them, and with other refreshments close at hand.

Mr. Chas. Bundschu, as Chairman of the Building Committee, was the first speaker. He said:

Ladies and Gentlemen: The duty devolves upon me, and I accept the same with a feeling of joyful gratification, to present to the Executive Committee of Viticultural Exhibitors this new addition to our glorious Midwinter Fair—this Palace of Viticulture. After extended labors it stands completed in its artistic glory and its wonderful harmony of beauty. In the name of the Building Committee, I hereby tender it to you, Mr. President, and to your exhibitors, and trust it may proclaim the proud position we so justly claim for our industry in spite of all reverses. May it mark the beginning of a new era, and may the dawn of prosperity and better times for our vineyardists radiate from its picturesque dome.

The available funds, $2,076 from the State Viticultural Commission, $3,182 50 from subscriptions by vineyardists and others, $3,500 from the San Francisco Wine Dealers' Association, in all, $8,758 50, were hardly sufficient to undertake, finish successfully, and pay for a work of these dimensions. But the members of your Building Committee—Messrs. Henry Epstein, E. C. Priber, Wm. Wehner, Clarence Wetmore, Tiburcio Parrott, F. Korbel, Claus Schilling, and my humble self as Chairman—worked faithfully to bring about a satisfactory result. Assisted by our architect, Mr. J. I. Newsom, and by the liberal contractor of the building, Mr. T. M. McLachlan, but above all ably supported by the untiring energy of our artistic decorator, Mr. Ernst A. Otto, seconded by the genial sculptor, Mr. Dobbertin, we accomplished our trust. I may also mention here the unremitting assistance tendered to us by Mr. J. R. Baker, our Manager. To all these gentlemen the committee expresses sincerest thanks and appreciation. Our task has been fulfilled, and we hereby surrender the building to its noble purposes.

Mr. I. De Turk, the Chairman of the Executive Committee of the Viticultural Exhibitors, accepted the structure from the Building Committee. He said:

It affords me great pleasure, on the part of the Executive Committee of the Viticultural Exhibitors, to take from the Building Committee this beautiful structure, which is such a credit to viticulturists, and at the same time such a credit to the Exposition. I trust that this will not only mark a new era in viticulture in California, but that it will mark a season of such harmony as we have not recently experienced. I take great pleasure in now turning the building over to the Executive Committee of the Midwinter Exposition, for whom I believe Director-General de Young will speak on this occasion.

Director-General M. H. de Young was greeted with applause when he arose to speak. He said:

Mr. President, Ladies and Gentlemen: It becomes part of my official duty to be present at and to say something generally at the opening of the different sections of this Exposition, but as I look around me here to-day, I think I echo your sentiments when I say that I do not believe you want to listen to a speech. Yet I cannot escape a feeling of pride, which I am sure you must share, in what we see here to-day; pride in our viticulturists, who have had the energy and the power to make such a beautiful viticultural display in the face of the depression which has existed in that line of business. I look upon viticulture as the principal, or one of the principal, interests of our State. In all my public acts I have uniformly been a friend of viticulture and the viticulturists. I have a strong belief in the future and lasting success of our State in the development of this great industry. The American people, I am proud to say, are fast becoming educated to the fact that good wines can be produced in our own country. A few years ago one could not get a glass of California wine at an American hotel or restaurant, but now it is being placed on bills of fare, and is fast becoming popular. This is a small matter, perhaps, but it shows the advancement that California wines are making.

The Wilson bill, which was passed the other day in Washington, left a tariff of 50 cents a gallon on wine, and by some jugglery an amendment was added in the House by which no duty shall exceed 100 per cent ad valorem. Now what does this mean? It means that cheap wine, which is brought to this country in wood, and which is billed at 8 cents a gallon, shall not be charged more than 8 cents duty, so that it can be sold as

low as 16 cents. I simply call your attention to this fact, because it seriously threatens your interests; unless some of your representatives in Washington stop it, grave results may follow.

And now, Mr. President, I do not want to take up your time, as I understand there are other speakers to be heard, but, in the name of the Executive Committee of the Exposition, I thank you for this beautiful building, for the interest you have taken in making this display, and for the loyalty you have already shown the Exposition and the support you have given it.

At the conclusion of Mr. de Young's speech, Mr. F. A. Haber, Chief of the Bureau of Viticulture, was called upon for a few remarks. He spoke as follows:

Ladies and Gentlemen, and Viticulturists: I agree fully with the Chairman of the Building Committee that this auspicious opening of this beautiful palace ought to bring a new era, not only in the viticultural industry, but a new era in connection with all industries in California. Following closely, as it does, the opening of this Exposition, the third largest in the world, and second to none in its artistic surroundings, it should indeed mark the beginning of a new era. But the opening of this palace means more than the beginning of a new era in a business sense. What we have been suffering from, particularly in connection with viticulture in this State, is not so much a low price for our wines as it is from a lack of information regarding them. There has been a lack of knowledge of what wine is, and what it ought to be, in every country. If we could induce Americans to drink their own wines, it would answer two of the most important questions before our country to-day. Perhaps the greatest question at issue, from a moral sense, is temperance or intemperance. Wine is temperance. We have but to look to the wine-producing countries of the world: to France, to Spain, to Italy, to Germany, and to the south of Russia, and we find there that drunkenness is the exception, and it is because the people there drink wine.

When the American people shall become a wine-drinking people, they will be a temperate people. You will readily recognize the fact that Americans are not wine-drinkers when I tell you that the one city of Paris consumes about three times more wine than the whole of the United States of North America. Paris last year consumed 110,000,000 gallons of wine, and the entire amount consumed in this country last year was 44,000,000 gallons. If we become wine drinkers, we will not have need of prohibition laws, and we will close the mouths of the carpers who are trying to undermine the very ground-work of our National Constitution. When Americans learn to drink their own wines, eat their own food, and wear their own manufactures, they will have no need of tariff laws. These are certainly important considerations.

You wine merchants know that what I say is true, and many of you have lived to see great changes in this connection. I, myself, am not a very old man; indeed, I consider myself a very young man; but I remember that in the city of New Orleans, where I was raised, there was on a certain block one lager beer saloon, and every man who went into that saloon was pointed out as a beer-drinker. What is the history of beer in this country? We are the third largest beer-drinking population in the world, and it has been simply a lack of education that has not made us wine-drinkers instead. We have first to thank the German-Americans for opening the way to the people of this country out of the fanaticism that so long possessed it, and I am glad to know and to feel that there is hope for the further development of the American people in the direction of making a greater use of their own products in this line.

I propose a name dear to every wine grower and dealer in the United States—a woman who has done more than any other for the cause of temperance and breaking down the barriers of ignorance in regard to our great interest, who has devoted her time and the columns of her journal, "Kate Field's Washington," in preaching the gospel of the grape. No one deserves more thanks, and we here evince our deep appreciation of her great services in saying: "All honor to Kate Field."

The last speaker of the occasion was Hon. M. M. Estee, who was introduced by Chairman Bundschu, and who spoke as follows:

Ladies and Gentlemen: I was invited out here by the producers of California to talk to you a few minutes to-day; but I think, judging from the surroundings, that few of you came here to listen to speeches. I think it would be a travesty on the occasion for me to attempt even a little speech, and that is certainly the only sort of one I could make under the circumstances, for I have not been here long enough yet to feel the effects of your wine. However, if I were to say anything to you here to-day, I would say that grape growing in California is one of the most important industries of the State. I would say that God made this a grape-growing country, and man cannot change it. It is true that we may have to change our tariff laws; but the grape will grow in California just the same, and we must provide a market for it. Times may come when the merchants, and the producers as well, may find themselves in debt. Most of us are in debt; at least all are in my section of the country; and yet the culture of the grape goes on, because the soil, the climate, and everything about California makes it the

PLATE III.—STATUARY CAPPING THE CENTER PIECE.

[Published by permission of Taber, photographer, San Francisco.]

home of the grape. No country in the world presents such advantages for viticulture and viniculture as California, and if we fail it will be through our own mistakes. It will be because we, as Californians, do not know how to carry on the business. We have from sixty to seventy millions of dollars invested in California in viticulture, and we have 80,000 acres of land in wine grapes, and 100,000 acres in table grapes and raisin grapes. We have 700 wine cellars in this State, and, ordinarily, we ought to make about 25,000,000 gallons of wine. Of course that is more than we can drink. We may be very bad, or good, but we cannot drink that much wine, and so we have to sell some of it.

Recently we tried to sell it, and some have failed; but that should not discourage us. We are satisfied that we are improving the industry. We are making better wine than we ever made. We are making first-class wines. We are making as good wine as is made in any country of the civilized world. We make a very good champagne, though brother Haraszthy over there may not think so, and we make as good a white wine as any of the white wines of the Old World, except the very finest grades. There's a place called "Hedgeside" where I think we make good claret. We are not discouraged; we are encouraged. If we cannot sell our wines, we have to keep them. They say that wines are better as they grow old. If that be so, then, my friends, come around in a year or two from now and you will find us with generous hearts and with even better wines in our cellars. If there are any Eastern people here, I hope they will visit us at our homes among the vines, and when we open our doors to them we will say, "Look here and be satisfied. Come to this land of silver and honey and wine and fruit and be happy. If you have some money bring it with you. Don't leave that behind, because we need it." I trust that after this little ceremony is over, none of those who are here present will be backward about trying the wines that are here spread out before you, and when you have tried them, I am sure you will like them. Perhaps it will induce you to come again, and some of you may see fit to settle among us, and therefore I say, you are invited, all of you, not all at once, but, rather, one at a time, to visit us in our homes among the vines, as I have already said, and I promise you once more, that you will find us generous of heart, and that you shall have a greeting full of all the hospitality that Californians can give.

At the conclusion of Mr. Estee's speech, Chairman Bundschu invited every one to partake of the collation which had been spread, and to wash it down with whatever kind of wine they fancied most.

After Mr. Estee had concluded and the tasting of the wines was begun, Mr. Bundschu was called on for an extemporaneous toast, and he responded as follows:

Responding to the kindly remarks propounded by Hon. M. M. Estee, in recognition of the efforts of the Building Committee, I can only say, I thank you. Whatever services may have been rendered to secure success, they were cheerfully given for the furtherance of a noble cause: the promotion and dignified representation of California's greatest industry at this Midwinter Fair.

If any one were lacking in flow of eloquence to express a sentiment in response to a toast (which is my case), all he might be expected to do under such genial circumstances would be to glance about and fasten his eyes over this cellar entrance, where these huge and beautiful casks stand out boldly and impressively like sentinel domes in Yosemite Valley. Here the suggestion greets us:

"Too much you can touch,
But never enough—if good be the stuff."

Our hospitality to every one to-day is unbounded and unrestricted, but it may be well for us all to be mindful of our poet's mysterious advice. Right here before me I note a pleasant sentiment truthfully expressed:

"Here amidst bright eyes and faces,
Here sorrow cannot reach."

Of course not; how should it? Where "bright eyes and faces," where "graces and laces" pay homage to our noble sovereign "Bacchus," joy, merriment, and laughter are the order of the day, and they will reign. Still, here on the south side, over this lovely panorama of the Golden Gate, with the halo of the setting sun in the distance and the vineyards of Goat Island in the foreground, the legend is spread:

"Hail, California, glory to thee!
Nature's great wonder, noble and free."

And I can add nothing further to this glorification of the land of the setting sun but the sincerest wish that our good, great, and noble country, our beloved California, may be happy and prosperous forever.

The festivities continued until about 6 o'clock, interlarded by the national songs of America, Germany, France, Italy, and other countries, and music by the orchestra.

INSTRUCTIONS TO JURORS.

As will be seen by the report of Mr. J. R. Baker, who was in charge of the display, the "Palace" was visited by many thousand people in spite of its rather unfavorable location. For particulars, reference is made to the report of Mr. Baker.

The viticultural exhibitors were naturally anxious about the system of making the awards. After a rather trying experience at Chicago, this feature was closely watched here, and the instructions which were formulated by Mr. Arpad Haraszthy were evolved after long study. They were in every way satisfactory to the exhibitors, and if only as a model for future exhibitions they should be republished here.

INSTRUCTIONS TO THE JURY OF AWARDS, MIDWINTER FAIR.

DEPARTMENT A, GROUP 20.

Gentlemen Jurors: Recognizing the several and specific qualifications which so eminently fitted you to be Jurors in Group 20, Department A, the Administration of Awards of the Midwinter Fair, with full confidence in your knowledge, judgment, and perfect impartiality, has appointed you with full power to act in that delicate and most important capacity. Knowing that you will fill your self-accepted task with justice to the competitors, credit to the Administration, and honor to yourselves, I offer as a guide the following classification, general rules, and suggestions, with the request that they be followed as closely as possible by each of the sub-groups. Your time being limited, it will be well to begin your labors at once and bring them to a speedy end.

The general classification of wines, both native and foreign, should be as follows:

Red Wines.
White Wines.
Sweet Red Wines.
Sweet White Wines.
Sparkling Wines—Natural Process.
Sparkling Wines—Carbonized Process.
Brandies.

These are to be again divided into the following types:

Red Wines: (1) Claret type; (2) Burgundy type; (3) Hungarian type; (4) Spanish type; (5) Italian type. The Spanish type of red wines will cover the red wines of Greece and Algiers.

White Wines: (1) Sauterne type, sweetish character; (2) Sauterne type, dry; (3) Rhine wine type; (4) Burgundy type (which covers the Chablis and other white wines of the Burgundy district).

Sweet Red Wines: (1) Oporto type; (2) Alicante type.

Sweet White Wines: (1) Tokay type; (2) Sherry type, dry; (3) Sherry type, sweet or mellow; (4) Madeira type; (5) Malaga type; (6) Sweet Muscat type; (7) Angelica type.

Sparkling Wines—Natural Process: (1) Brut type; (2) Dry, or extra dry type; (3) Sweet or fruity type.

Sparkling Wines—Carbonized Process: To be divided into the same types as those wines made by natural process. It will be the duty of the sub-committee of Jurors judging champagnes and sparkling wines to ascertain positively, if possible, whether the same were made by the natural process or by the carbonized process, and render their decision accordingly.

Brandies: To be classified according to age and to be tried upon their merits as understood and acknowledged by brandy experts.

The wines to be tried by the Jurors should be brought to their several proper temperatures before the trial begins. The red wine types should be from 60° to 65° Fahr. The white wine types from 50° to 57° Fahr. The sweet, red, and white wines from 65° to 70° Fahr. The sparkling wines from 40° to 50° Fahr. The experienced judge will recognize the necessity for these temperatures.

It is exceedingly important to have each class of wine tried in its proper glass. All of these should be thin, perfectly white, and every exhibitor should have his wine tasted from glasses of the same shape and size as that of his competitor, and no variation shall be permitted; all are treated alike. Regulation glasses for each type will be provided for the Jurors.

The wines should be tasted in a moderately cool room where the temperature is about 60°; otherwise full justice could not be done to the delicacy of many wines presented.

All bottles submitted to the Jurors must be carefully wrapped, so as to prevent any identification whatever. This will enable the Jurors to arrive at a decision based only upon the merits of the wine tried. The competing wines should be wrapped with the same kind of paper, without any mark or number thereon. Complete uniformity must be impartially maintained for every exhibitor. The removal of corks and capsules should be done by an attendant, so that none of the Jurors may notice or recognize any mark tending to indicate who the exhibitor is, thus giving the most convincing proof of absolute impartiality.

When the trial begins, the Chairman of the group of Jurors will order the first bottle presented for trial marked "1"; when a conclusion is reached as to merits, and after full notes are taken by the Secretary of each sub-group, then only the wrapper is to be removed and the label shown.

The points guiding the Jurors to reach conclusions of comparative merit will be the following: (1) Brightness of the wine; (2) Beauty of color or shades of color; (3) Perfection of bouquet; (4) Purity and delicacy of taste; (5) Quality of body; (6) Quality of savor; (7) Proper alcoholic strength; (8) Harmonious perfection of the whole.

In trial for sparkling wines the two following additional points must be considered: (9) Vivacity of sparkle; (10) Duration of sparkle. Each of these, if perfect, would be given 100; if not, a so much less numerical valuation as the Juror may indicate. Afterwards an average is to be struck of the sum total, which, divided by eight for still wines and ten for champagnes, will stand as the credit of the wine in question.

The amount of wine to be placed at the disposal of Jurors, for dry wines, sparkling wines, sweet wines of each type, and brandy, must not be less than two quart bottles, with the privilege of drawing two more to set at rest any question that might arise.

Each of the sub-groups should elect from its number a Secretary, whose duty it will be to make full notes of all its proceedings, and to report credits given by said sub-committees to each wine of competing exhibitors, and at the end of its labors to hand a copy of the same to the Secretary of the Committee of the Whole, for the use of the Chairman and Secretary to make their final report to the Committee on Awards.

It is unnecessary to state that no competitor should be present at the trial of his wines, and that each day's proceedings should be kept strictly secret until the final report of the Committee of Awards is made public.

Regarding California wines, it may be well to draw attention to the fact that there is now grown in our State every European variety of wine and table grapes planted on soils of every known kind, either on mountain or plain, with every possible exposure and under widely differing climatic conditions, ranging from the semi-tropical temperature of our great valleys, in the south and interior, up to the very edges of our snow-capped mountains. It is not to be wondered, therefore, that many wines are grown in the above varying conditions that in a measure resemble the types and broad characteristics of those grown in the several European countries. These conditions existing, our California wine producers, without any attempt at imitation, have tried to approach the general good qualities of the above European types of wine by careful handling and the planting of the most renowned varieties of grapes; and it will remain for you to determine how near our wine growers have approached the general type claimed or how far they may be away from it.

In passing upon the California wines the Jurors should be guided solely by the claim set forth on the label by the competing exhibitor as to classification of type, etc.

While trying California wines the Jurors should also consider whether the same are bottled in bottles properly belonging to the type it is claimed they represent; that is to say, claret in claret bottles, sauterne in sauterne bottles, rhine wine in regular rhine wine bottles, burgundy in regular, or apparently regular, burgundy bottles. The more or less neatness of label, capsule, and general get-up should also be considered, and remarks favorable or otherwise made note of; these latter should not, however, increase or detract from the number of credits previously given the exhibitor for his wine or wines.

The above suggestions and rules are offered in the spirit of fairness for all exhibitors. The condition creating their necessity is well known to competent wine judges, and it is hoped that they will be followed as closely as the circumstances will warrant. All that we desire is that the wines, whatever country they may come from, or whoever the exhibitor may be, should be impartially judged and passed upon under the most favorable circumstances.

Respectfully submitted.

ARPAD HARASZTHY,
Chairman.

P. S.—At the suggestion of well-known brokers and importers of foreign wines, it has been deemed best not to cover with a wrapper the foreign red and white dry wines and brandies, but to leave the same open for inspection and to be considered by the Jurors selected for their examination. No exception, however, will be made for foreign champagnes; they are to follow rigorously the rule demanding their wrapping up effectually, as indicated.

THE AWARDS.

The following awards were made in the Viticultural Section of the Midwinter Fair:

AMERICAN SECTION.

Arpad Haraszthy & Co., San Francisco, first, Eclipse, Extra Dry, Brut, and Carte Blanche champagnes.

Paul Masson, San José, second, Sauterne, Burgundy, Pinot variety, and champagnes.

Antonio Domenici, third, California champagnes, carbonated.

H. R. Schell, Knight's Ferry, second, grape brandy.

The Natoma Vineyard Company, Natoma, first, California grape brandy.

B. H. Upham, Martinez, third, California claret, Alicante.

Edward E. Goodrich, Santa Clara, second, California claret, Carignan.

A. Brun & Co., Oakville, first, California white wine, Semillon.

J. L. Beard, Warm Springs, second, California wine, Zinfandel.

Margherita Vineyard, Fresno, second, California red wines, Burgundy types, and Port wine.

A. Repsold & Co., San Francisco, second, California wine, Tokay type.

Dresel & Co., Sonoma, first, California wines, Zinfandel and Riesling.

I. De Turk, Santa Rosa, first, California wines, Zinfandel and Burgundy.

C. A. Wetmore, Livermore, first, California white wines, Sauterne types.

John Crellin & Sons, Livermore, first, California white wines, Hock type.

William Wehner, Evergreen, first, California white wines, Yquem type.

A. Grimm & Co., Calistoga, first, California white wines, Hock and Sauterne types.

C. K. Kirby, Fowler, first, California white wine, Sauterne type.

J. D. Peters, Atwater, third, California Port wine.

F. W. Billings, Redwood City, second, California red wine, Mondeuse, and California white wine, Sauvignon Vert.

Barton Estate, Fresno, second, California Port wine.

George West & Son, Stockton, first, California white wine, Sauterne type, grape brandy and Port wine.

Jacob Schram, St. Helena, first, California white wines, Schramsberger and Riesling.

Beringer Brothers, St. Helena, first, California wines, Zinfandel and Muscat.

A. R. Scott, Santa Clara, first, California red wines, Zinfandel and Petit Pinot.

The Ben Lomond Wine Company, Ben Lomond, first, California red wine, Cabernet, and California white wine, Riesling.

The E. G. Lyons Company, San Francisco, first, California red wines, Cabernet and Burgundy types, and California white wine, Sauterne type.

H. W. Crabb, Oakville, first, California red wine, Zinfandel and Burgundy types, and California white wine, Chablis type.

Tiburcio Parrott, St. Helena, first, California red wine, Chateau Margaux type.

Fountaingrove Vineyard Company, Santa Rosa, second, California red wine, Cabernet Sauvignon.

C. A. Baldwin, Santa Clara, third, California red wine, Cabernet Franc, and California white wine, Sauvignon Vert.

Henry Hagen, Napa, first, California red wine, Bondola.

F. Korbel & Brothers, Korbel's Mills, first, California white wine, Zernosek.

William Palmtag, Hollister, second, California white wines, Riesling, Gutedel, and Sauterne types.

Italian-Swiss Colony, Asti, first, California red wine, Barbera.

Italian-Swiss Colony, Asti, second, California white wines and Sparkling Muscat.

St. Hubert Vineyard, Fresno, second, California Port wine.

California Wine Growers' Union, San Francisco, second, California red wine, Burgundy type, and California white wine, Sauterne type.

Eggers & Co., Fresno, second, California Port wine.

Kortum & Fuelscher, Calistoga, third, California grape juice.

Ewer & Atkinson, Rutherford, non-alcoholic grape juice.

California Grape Food Company, Los Gatos, second, Sanitas grape food.

J. H. Yerrington, third, currant wine.

REPORT OF CHARLES BUNDSCHU,

Treasurer and Chairman of the Building Committee.

SAN FRANCISCO, September 4, 1894.

To the President and Members of the Executive Committee of Viticultural Exhibitors of the California Midwinter International Exposition, San Francisco, Cal.:

GENTLEMEN: After the labors connected with the Viticultural Palace have been closed, and the building and all its contents disposed of to the best possible advantage, I hereby beg leave to submit the following financial report:

RECEIPTS.		
From State Viticultural Commission	$2,076 00	
From San Francisco Wine Dealers' Association, first subscription	1,000 00	
From San Francisco Wine Dealers' Association, second subscription	250 00	
From contribution to Building Fund by the Finance Committee of the Midwinter Fair	500 00	
From subscriptions to General Fund by merchants, growers, and friends	3,202 50	
From assessments, San Francisco Wine Dealers' Association	50 00	
From assessments, other parties	101 80	
From sundry refunds	33 35	
From commission on sales	104 52	
From proceeds of auction sale of fixtures	121 75	
From sale of building	130 00	
		$7,569 92
DISBURSEMENTS (AS PER VOUCHERS).		
T. McLachlan, building contract	$2,500 00	
T. McLachlan, extras	391 00	
E. A. Otto, contract for decoration	2,076 00	
E. A. Otto, extras on same	500 00	
Plumbing	52 00	
J. J. and T. D. Newsom, architects	100 00	
Fixtures and installation account and general sundries	570 30	

Stationery and printing account	$136 12	
Drayage and freight account	88 60	
Salary, Johnson and assistants	235 00	
Salary, J. R. Baker, January to August	605 00	
J. R. Baker, half commission on sales	52 26	
		$7,306 28
Balance in bank		$263 64
Besides the two subscriptions credited above in the general account, and amounting to		$1,250 00
The San Francisco Wine Dealers' Association expended on their exhibit, for their own account, the sum of		1,450 00
Making the total of their expenditures		$2,700 00

Owing to the liberality of the Executive Committee at the fair, in supplying the necessary electric lights, water, and guards free of charge, and besides assisting us in our financial difficulties by a cash contribution of $500, we were enabled to successfully meet our obligations, and show at the present time a small balance in our favor.

In the estimation of your committee there is no doubt that the architects, Messrs. John J. and T. D. Newsom, and the contractor and builder, Mr. T. M. McLachlan, have jointly erected a handsome and representative building, especially adapted for exhibition purposes; and Mr. E. A. Otto, who held the contract for interior decorations, has carried out most faithfully and conscientiously the intentions and suggestions of your committee; it is evidently due to his artistic taste and ability that our industry received such a distinguished representation at the Midwinter Fair.

A difference of opinion between your committee and Mr. Otto, in reference to extra charges outside of the contract, led to a final understanding whereby a claim of $1,141 25 was compromised for $500, Mr. Otto graciously relinquishing his claim on the balance of $641 25. We can only regret that in consequence thereof seious financial loss resulted to the artist, who bestowed so much intelligence and good will in the execution of his work.

The commendable and impartial methods under which the various complicated duties of our Superintendent, Mr. J. R. Baker, have been discharged, have earned for him the thankful appreciation of your committee and cheerful acknowledgment from all parties interested. His courteous and intelligent efforts to point out to the thousands of Eastern and local visitors of the Palace the merits and importance of our California viticultural products, without preference to individuals or partiality to districts, would have entitled him to a more substantial recognition than our limited resources could afford.

We also owe an expression of sincerest thanks to all the officers of the California Midwinter Fair—first of all to the Director-General, M. H. de Young, Esq.—for their hearty coöperation; to the members of the Executive Committee, for their most generous and valuable assistance on all matters of importance; to Prof. E. E. Smith, Chief of the Horticultural Department, and to Mr. F. A. Haber, Chief of the Viticultural Bureau, for their untiring cordiality in support of our interests. We also allude to the efficient services of Lieutenant Hassen, Chief of the Electrical Department, in connection with the elaborate display of light in the Palace, and to Captain Baldwin's kind protective supervision of our exhibits as Commander of the Midwinter Fair Guards. We finally express our thanks to Arpad Haraszthy, Chairman of the

Committee on Awards, and to all the members of the jury, for their careful and impartial labors and their earnest endeavors to recognize the praiseworthy progress and development of our industry.

This comparatively limited effort in the direction of consolidation and mutual support has demonstrated beyond doubt that concert of action and fairness of purpose must accomplish beneficial results. Let us hope that all future attempts to benefit or resuscitate viticulture in California will be carried out on similar principles of mutual harmony and good fellowship.

Respectfully submitted.

(Signed:) CHARLES BUNDSCHU,
Treasurer and Chairman of Building Committee.

REPORT OF J. R. BAKER,

In charge of Viticultural Palace.

219 SIXTH AVENUE,
SAN FRANCISCO, September 2, 1894.

To the Executive Committee of the California Wine Exhibit, California Midwinter International Exposition:

GENTLEMEN: The concluding duty intrusted to me by you being fulfilled, namely, the sale of the "Palace of Viticulture," a brief review of the routine work accomplished at the recent exhibit may be acceptable to you.

Out of a total of seventy-eight subscribers (counting the ten members of the San Francisco Wine Dealers' Association individually), fifty-one made exhibits of wine, and five exhibited cooperage, apparatus, bottles, supplies, etc.

Up to the time of the opening of the exhibit, on April 6th, only fifteen of the growers and nine of the merchants had agreed to, or already had, supplied samples; so well satisfied, however, were our exhibitors with the attractiveness and business opportunities of the exhibit, that nine more of the growers availed themselves of the sample-room, making a total of thirty-three different brands on the list of samples.

During the 101 days the exhibit was open, April 6th to July 15th, 2,842 sample half-bottles and bottles—mostly the former—were dispensed to presenters of invitation tickets alone; in addition to this quantity over 1,000 bottles and half-bottles were dispensed on special occasions and to visitors unprovided with tickets, as shown by over 4,000 empty bottles returned to exhibitors. Twenty-one cases of wine were also presented to committees for special celebrations, such as Horticultural Day, Santa Barbara and other county celebrations; to the members of the Fair Committee, and to members of the press.

By actual count, on days of *average attendance*, we had an average of 600 visitors to the "Palace of Viticulture" per day, or over 60,000 during the whole term; the percentage of Eastern people and foreigners was a good one during April and May, but decreased thereafter. However, I made special efforts at all times that none of such strangers should escape without having proof of the quality of our high-grade wines, and some information as to varieties, brands, uses, etc.

Herewith I send you a list of the awards won by the exhibitors; also a copy of the "Instructions to Jurors," formulated by Mr. Arpad Haraszthy, Chairman of the jury, who at all times personally supervised their work.

Very little interest was shown by our exhibitors, at first, in the matter of awards, and only nineteen of the wine growers and makers entered for award up to shortly before the judging commenced. But as soon as the excellent personnel of the jury, and that the method of judging to be adopted was to be with the bottles masked and by points of merit, became known, which was mainly through my own correspondence—as the administration published no information on the subject—thirty-three of the forty-one growers and makers exhibiting in the "Palace of Viticulture" entered for award.

Out of the 84 dry white wines entered, 12 received first-class, 5 second-class, and 2 third-class diplomas.

Out of the 73 dry red wines entered, 12 received first-class, 6 second-class, and 2 third-class diplomas.

Among 36 entries for sweet wines, only 2 received first-class and 3 second-class diplomas.

The 6 entries of sparkling wines gained 3 first-class and 2 second-class awards.

And among 17 entries of brandy, there were 3 first-class and 1 second-class awards.

Mr. Emil Meyer, the Secretary of the jury, was especially careful that no wine entered should fail to be presented to the jury, and that the rules regarding marking the bottles and removal of caps and corks before presentation to the jury were strictly adhered to. The comparatively small number of awards proves the severe criticism by the jury, and the hard-won awards were fairly won.

The auction sale of the building and its furnishings was held July 19th, as advertised in the "Chronicle" of July 14th and 15th. The attendance was poor, but the furniture, etc., brought a very fair sum, $121 75, the buyers being mostly our exhibitors, who desired souvenirs; but no offer was made for the building. Subsequently very few bona fide offers were made, and although I sought and interested several possible buyers, and twice an advantageous sale was nearly made to parties who could use the building and decorations in connection with the wine trade (most of the decorations being useless for any other purpose), yet the negotiations fell through, after much waste of time and effort on my part. The price finally obtained, $130, may appear a small sum for such a beautifully decorated building, but in comparison with sales of other Midwinter Fair buildings, vastly larger than ours—such as Horticultural Building for $700, Southern California Building for $310, Northern California Building for $260, etc.—the price obtained for ours is a fair one.

Trusting that material benefit will accrue to the California wine industry from our recent grand display in the "Palace of Viticulture"—for if the admiration and interest expressed by thousands of visitors count for anything, such benefit should reward your labors in behalf of the exhibit—and hoping that my humble services have been satisfactory to yourselves and the other exhibitors,

I am, gentlemen, respectfully yours,

(Signed:) J. R. BAKER.

PLATE IV.—View of One Side of the Display.

[Published by permission of Taber, photographer. San Francisco.]

MINUTES OF VITICULTURAL EXHIBITORS.

A meeting of grape growers, wine makers, brandy distillers, raisin packers and growers, and others interested in viticulture, was held at the office of the Board of State Viticultural Commissioners on Friday, December 1, 1893, at 2 P. M., in pursuance of the following call:

San Francisco, November 24, 1893.

Dear Sir: At the request of a number of persons interested in viticulture, the Executive Committee of the Board of State Viticultural Commissioners authorizes me to call a meeting of the grape growers, wine makers, wine dealers, raisin growers and packers, and all other persons interested in the viticultural industry, for the purpose of adopting plans for a collective exhibit at the Midwinter Fair, such as will be a credit to all concerned and to the State.

This meeting will be held at the office of the Board of State Viticultural Commissioners, 101 Sansome Street, San Francisco, on Friday, December 1, 1893, at 2 P. M. At that time plans for exhibit will be presented and discussed.

Very truly yours,

WINFIELD SCOTT,
Secretary.

Among those who responded were: I. De Turk, Santa Rosa; M. M. Estee, San Francisco; Albert Lachman, San Francisco; Charles Bundschu, San Francisco; Judge John A. Stanly, San Francisco; Henry Epstein, San Francisco; E. C. Priber, San Francisco; Chas. Kohler, San Francisco; Claus Schilling, San Francisco; P. C. Rossi, Asti and San Francisco; A. Sbarboro, Asti and San Francisco; B. M. Lelong, San Francisco; H. H. Sherwood, San Francisco; J. Ch. de St. Hubert, San Francisco; E. H. Rixford, San Francisco; C. J. Wetmore, Livermore; John Crellin, Livermore; Benj. P. Barker, Livermore; William Palmtag, Hollister; A. Malpas, Los Gatos; Wm. Wehner, Evergreen; Paul Masson, San José; E. E. Goodrich, Santa Clara; C. M. Mann, San Francisco; A. Korbel, San Francisco; A. Repsold, San Francisco; Pierre Klein, Mountain View.

The meeting was called to order by I. De Turk, of Santa Rosa, who stated that the objects of the meeting were to make some arrangements for a collective exhibit of wines and brandies at the Midwinter Fair.

On motion of Mr. Epstein, duly seconded, Mr. De Turk was elected permanent Chairman of the meeting.

On motion of Mr. Rossi, Mr. Scott was elected permanent Secretary.

Mr. De Turk called upon F. A. Haber, Chief of Viticulture at the Midwinter Fair, for a statement of what was proposed to be done. Mr. Haber made a long address, in which he stated that a fine display could be made for from $10,000 to $20,000, and he also submitted plans which he had prepared at his own expense.

In response to a query, Mr. De Turk stated that the Viticultural Commissioners could spend $1,500 to $2,000 for an exhibit, not of wines but of vines, etc. The Commissioners would coöperate in the main show.

Mr. C. J. Wetmore explained the mode in which such expenditure could be made.

In order to test the sense of the meeting, Mr. Bundschu moved that the exhibitors who went into the collective exhibit should not compete for awards. Seconded by Charles Kohler and discussed by M. M. Estee and others. On vote being taken the motion was lost.

Mr. Epstein then moved: first, that the exhibit be a collective one; second, that the exhibitors in such a display compete for prizes or not, as desired. Seconded, discussed, and carried.

Statements were then made that money was needed; that the time was short; and Messrs. De Turk and Haber called for subscriptions, it being understood that no one should be called on for the money unless the sum total was subscribed.

The following subscriptions were made:

Board of State Viticultural Commissioners	$2,000 00
J. A. Stanly	100 00
Italian-Swiss Colony	100 00
F. Korbel & Bro.	100 00
I. De Turk	100 00
Inglenook Vineyard	100 00
H. H. Sherwood	100 00
John Crellin	50 00
A. Repsold & Co.	50 00
Wm. Palmtag	50 00
J. P. Smith	50 00
Wm. Wehner	50 00
Paul Masson	50 00
E. E. Goodrich	50 00
Capt. J. Ch. de St. Hubert	50 00
Los Gatos and Saratoga Wine Co.	50 00
B. H. Upham	50 00

Wm. Wehner moved that a committee of five be appointed by the meeting to act with the Viticultural Commissioners in preparing the exhibit, and to arrange details of making it. Carried.

The following were named and confirmed: P. C. Rossi, Wm. Wehner, A. Repsold, A. Malpas, and Henry Epstein.

It was moved and carried that this committee, with the Viticultural Commissioners, proceed with the collection of funds, and take charge of the matter generally.

After some further general discussion the meeting adjourned.

A meeting of the Executive Committee of the Exhibitors and Viticultural Commissioners was held at 4 P. M., Friday, December 1, 1893, at 101 Sansome Street.

Present: Viticultural Commissioners De Turk, Priber, and Bundschu, and Messrs. Rossi, Wehner, Repsold, Malpas, Epstein, C. J. Wetmore, and Scott.

I. De Turk called the meeting to order, and, on motion of Mr. Rossi, was made permanent Chairman.

On motion of Mr. Rossi, a committee of two was appointed to visit the wine merchants of San Francisco and solicit subscriptions. Messrs. Bundschu and Epstein were appointed.

On motion, Messrs. Wetmore and Scott were appointed a committee to prepare a circular letter to the people of the interior, soliciting subscriptions and telling of the action of the day.

On motion of Mr. Priber, Mr. Wetmore was requested to supplement this work with personal work in the counties, and the Chairman was instructed to appoint a committee of two or three in each county to aid in the matter.

The Chair stated that he would appoint the committees later, but the following partial committees were announced:

Santa Clara	Wm. Wehner and A. Malpas.
Sonoma	I. De Turk and P. C. Rossi.
Napa	E. C. Priber.
Alameda	C. J. Wetmore.

Mr. Epstein moved that whereas there appeared difficulty in obtaining sufficient funds for making a creditable collective exhibit of wines, etc., at the Midwinter Fair, a committee of four be appointed to wait on the proper Midwinter Fair authorities, with a view of obtaining suitable space for the display on the best possible terms. Carried.

Messrs. Epstein, Bundschu, and Wehner were appointed such committee.

On motion, it was decided to elect permanent officers, resulting as follows: President, I. De Turk; Vice-President, C. J. Wetmore; Secretary, Winfield Scott; Treasurer, Charles Bundschu.

At the request of Mr. Bundschu, an auditing committee, to consist of Messrs. Repsold and Epstein, was appointed.

Adjourned.

San Francisco, December 7, 1893.

A meeting of the San Francisco wine merchants and shippers was held at the office of the Viticultural Commission, 101 Sansome Street, December 7, 1893, at 2 P. M.

Among those present were Charles Bundschu, C. J. Wetmore, Wm. Wehner, H. Epstein, W. E. Stevens, Hans Kohler, R. J. Harrison, P. C. Rossi, Albert Lachman, J. J. Jacobi, Mr. Wertheimer, E. C. Priber, and Winfield Scott.

Mr. Scott called the meeting to order, and announced that the election of a permanent Chairman was in order.

Mr Epstein was nominated and elected.

Mr. Epstein made a statement to the effect that the San Francisco wine dealers had had a meeting the day before, and that they had decided to go into the exhibit in a body, providing they could be placed together. Their object would be to make a strictly commercial exhibit, and they did not care for prizes. He subsequently amplified this by stating that the dealers would contribute $1,000 to the general fund, and bear the expenses of putting up their part of the display if the proposition was accepted.

Mr. Wehner said it was understood that there should be no segregation.

Arguments and remarks were made by Charles Bundschu, J. J. Jacobi, E. C. Priber, F. A. Haber, P. C. Rossi, and others, and the matter was finally disposed of by asking the Executive Committee of the Exhibitors' Association to call a meeting for Monday, at 3 P. M., at which time the dealers' proposition would be acted upon.

Adjourned.

San Francisco, December 11, 1893.

A meeting of the grape growers, wine makers, wine merchants, shippers, etc., was held this day at 3 P. M., at the office of the Board of State Viticultural Commissioners, in pursuance to a call.

Among those present were: I. De Turk, E. C. Bichowsky, George West, Hans H. Kohler, John A. Stanly, Capt. J. Ch. de St. Hubert, A. Repsold, Pierre Klein, F. Korbel, E. C. Priber, W. W. Lyman, P. C. Rossi, A. Sbarboro, R. J. Harrison, W. E. Stevens, B. H. Upham, L.

Wagner, Charles Bundschu, J. J. Jacobi, Henry Epstein, William Wehner, Paul Masson, C. J. Wetmore, F. L. Fowler, F. A. Haber, M. M. Estee, A. Lachman, E. E. Goodrich, and some others.

I. De Turk presided.

The minutes of the last meeting were read, and subsequently, for the information of all concerned, the minutes of the Executive Committee were read, as well as those of the meeting of San Francisco shippers and merchants.

Mr. De Turk called for a statement from the Wine Dealers' Association, as to what they propose to do at the Midwinter Fair in the collective exhibit.

Mr. Epstein, speaking for the dealers, said that the association proposed to donate $1,000 to the common fund, and in addition to bear the expense of putting up their own portion of the exhibit; provided, that the merchants would not be separated and their individuality not lost; they would conform to the general plan, and would not compete for prizes.

In response to a query, Mr. Epstein said that the merchants would abide by the award of space made to them by the Executive Committee.

Mr. West moved the proposition of the Merchants' Association be accepted.

Remarks were made *in extenso* by Messrs. Epstein, Rossi, Stewart, Wehner, Stephens, Bundschu, and others. After an hour's discussion, Mr. Wetmore amended the motion of Mr. West, that all organizations and counties so wishing it, be given space and be individualized.

This was carried, as was also the original motion.

A statement was made that the subscriptions amounted to $7,200, of which $1,000 would come from the merchants, $2,500 would be spent by them, $2,000 from the Viticultural Commissioners, and $1,600 from various subscriptions.

Additional subscriptions to those received at the previous meetings were recorded as follows:

San Francisco Wine Dealers' Association	$1,000 00
Geo. West & Son	50 00
R. D. Stephens	50 00

Pierre Klein gave notice that he had withdrawn his exhibit.

The open letter to M. H. de Young, Director-General, from C. E. Bowen, was read, and, in addition, Mr. Scott read a letter of R. C. Terry, supporting Mr. Bowen's position.

The letter was discussed, and the resolutions of the Viticultural Commissioners in the premises were read.

Mr. Epstein moved that a committee of three be appointed to call on the Midwinter Fair authorities, and make an appeal that no wines be sold on the fair grounds except those exhibited and bearing producers' or legitimate dealers' labels. Carried.

The Chair appointed Messrs. Bichowsky, Epstein, and Rossi.

Mr. Epstein moved that the Executive Committee be empowered to engage such space as they may require to carry out the objects of this meeting; and to apply the funds already subscribed to pay for the space and to erect the exhibit. Carried.

Mr. Jacobi moved that one day be set aside as a Viticultural Day, late in the fair. Carried.

Adjourned.

SAN FRANCISCO, December 13, 1893.

Mrs. E. W. Scott, of Santa Clara County, this day subscribed $50 to the Midwinter Fair Viticultural Fund.

SAN FRANCISCO, December 18, 1893.

Additional subscriptions:

John L. Beard	$20 00
H. B. Wagoner	10 00
F. A. Haber, for Wilkins & Co.	50 00
E. Schirmer	20 00
Charles Bundschu, for Landsberger & Son	50 00

A meeting of the Executive Committee of the Midwinter Fair Exhibitors was held at the office of the Viticultural Commissioners on Monday, December 18, 1893, at 2 P. M., for the purpose of conferring with the San Francisco merchants.

I. De Turk presided and Winfield Scott acted as Secretary.

Among those present were Henry Epstein, C. J. Wetmore, Charles Bundschu, William Wehner, Hans H. Kohler, P. C. Rossi, I. De Turk, Claus Schilling, E. C. Priber, and Mr. Van Bergen; also F. A. Haber, Chief of Viticulture.

The minutes of the previous meeting were read and subsequently approved.

There ensued some discussion over the manner in which the State Viticultural Commission could expend its funds. In this discussion Messrs. Bundschu, Priber, Wetmore, Rossi, De Turk, and others participated, and finally, on motion, duly carried, the Commission was requested to make its contribution to the Midwinter Fair funds as large as it possibly could for the erection of the structure in which the exhibit would be displayed; and also to request Mr. C. J. Wetmore to go to Sacramento and make what arrangements he could with the State Board of Examiners for the expenditure of the funds.

Mr. William Wehner reported the following additional subscriptions from Napa Valley:

Tiburcio Parrott	$100 00
Jacob Schram	50 00
Beringer Bros.	50 00
Ewer & Atkinson	50 00
H. W. Crabb	50 00

Mr. Jacob Schram reported the following subscription:

A. Grimm	$50 00

Mr. Wehner reported that every one in the valley whom he had seen had contributed when the matter was properly explained. The question of space at the fair then came up. A motion was made authorizing the Treasurer to close for the space selected when the committee visited the Horticultural Building. This received no second.

Then a general talk ensued on the space. It was developed that the exhibitors could not now get the space they agreed to take when they

visited the Horticultural Building, and that certain aisles were to be closed and entrances to be changed.

This did not suit the majority of those present. Mr. Haber said that the space now offered was 40 by 64 feet. An hour's talk ensued, and then a committee of four was appointed to go to the Midwinter Fair headquarters and get some clear light on the question of space.

Messrs. Schilling, Rossi, Wehner, and Kohler, accompanied by Mr. Haber, proceeded to the Midwinter Fair headquarters, and the others waited for definite information.

On the return of the committee, Mr. Kohler reported that there was a width of 46 feet in the clear; that 10 feet of this had been given to Abramson & Heunisch for a cork exhibit; that there was a total of 1,440 feet available, for which $1,800 was wanted; and that the means of getting at the space were blocked by various exhibits.

Mr. Wehner moved that the Exhibitors refuse to take space, for the reason that the space offered is not sufficient and not well enough located to make a creditable display of the industry. Seconded.

An amendment to pay $1,800 for the space failed of a second, and then the original motion was passed unanimously.

Mr. Bundschu was appointed a committee of one to assist the Secretary in compiling a letter to the Director-General of the Exposition, apprising him of the action taken.

Minutes of the meeting of the Executive Committee of the Viticultural Exhibitors, held at the office of the State Viticultural Commissioners, 101 Sansome Street, San Francisco, on December 20th, at 11 A. M.

I. De Turk presided.

Among those present were Albert Lachman, J. J. Jacobi, C. J. Wetmore, F. A. Haber, Charles Bundschu, J. J. Weglein, Henry Epstein, A. Repsold, Hans Kohler, Henry Van Bergen, John Crellin, A. Malpas, and C. Carpy.

The Chairman stated the object of the meeting to be the consideration of a project to erect a suitable separate building for viticulture at the Midwinter Fair.

Mr. Bundschu made an elaborate statement of the course of events from the beginning until the present. He thought that the erection of a suitable building was the only recourse now open, and said that a committee, himself one of the number, had assurances from the Director-General that if such a building was erected, those who exhibited in it would have the same rights and privileges as the exhibitors in the main building, and besides would not have to pay ground rent.

Mr. O'Shaughnessy and Mr. Haber, of the Midwinter Fair, were present, and showed the ground plans of the spaces that were proposed.

After some discussion, a motion was made by Mr. Rossi, seconded and carried, that the space 45x60 feet, or thereabouts, west of the Horticultural Building, be accepted.

A motion was made, seconded, and duly carried, that the Chairman of the meeting, the Secretary of the meeting, and the State Viticultural Commission, and the Chief Executive Officer of the State Viticultural Commission sign the necessary papers to secure the space.

On motion of Mr. Al. Lachman, duly seconded and carried, a Build-

ing Committee of three was authorized to take charge of putting up the building.

The Chair appointed Messrs. Wetmore, Bundschu, and Epstein.

Mr. Wetmore stated that he would go to Sacramento and confer with the State Board of Examiners in relation to approving the bills that the Commissioners might incur in putting up the building.

On motion of Mr. Priber, a committee of two was appointed to accompany Mr. Wetmore to Sacramento and see if bills to the amount of $3,000 would be approved out of the Commission's funds. Messrs. West and De Turk were appointed.

On motion of Mr. Priber, a committee of three was appointed to petition the State Viticultural Commission for from $3,000 to $5,000 from its appropriation. Messrs. Priber, Bundschu, and Wehner were appointed.

David Woerner, through a member present, contributed a cask of 1,500 gallons (about) to the exhibit.

Mr. Haber called attention to the fact that Captain Niebaum had considerable material that would be exceedingly desirable for the exhibit.

On motion, Mr. Bundschu was appointed a committee of one to see Captain Niebaum in reference to the matter.

An appropriation of $50 was made to secure names petitioning the State Board of Examiners to audit bills of the Viticultural Commission for building the Viticultural Building.

Several plans for an exhibit, among them those of Capt. J. Ch. de St. Hubert and Mr. Wolf, were referred to the Building Committee.

San Francisco, January 16, 1894.

Additional subscriptions:

Sanders & Co. (per C. J. W.)	$50 00
M. M. Estee (per C. J. W.)	50 00
C. J. Wetmore	30 00
Lenormand Bros.	50 00

Minutes of the meeting of the Building Committee of the Viticultural Exhibitors, held at the office of the Board of State Viticultural Commissioners, 101 Sansome Street, San Francisco, on January 19, 1894, at 2:30 P. M.

Present: Messrs. Henry Epstein, Chas. Bundschu, C. J. Wetmore, F. Korbel, Wm. Wehner; also Mr. E. C. Priber, and afterwards P. C. Rossi.

Winfield Scott acted as Secretary.

After some discussion, Mr. Epstein moved that Chas. Bundschu be permanent Chairman. This was seconded by C. J. Wetmore, and carried.

Prior to the regular order of business, there was an informal discussion as to where the merchants (in the San Francisco Wine Dealers' Association) should have space allotted in the Viticultural Building. Mr. Priber, representing the merchants, and Messrs. Bundschu and Epstein, also of the Association, asked for space along the north wall, leaving the center for a collective exhibit of producers, an attractive center-piece, a fountain, or anything desired. They said they did not

want the producers to think that the merchants wanted undue favors or prominence, and that the Association would be content with a side space.

When the regular order of business began, Mr. Wehner asked that the allotment of space to the San Francisco Wine Dealers' Association be taken up. He therefore moved that the center space, under the dome, up to 20x20 feet, be allotted to the Wine Dealers' Association, they agreeing to bear the expense of putting up the exhibit, and to make it harmonious with the rest of the display.

F. Korbel seconded the motion.

Speaking for the merchants, Mr. Epstein stated that they would prefer the side, so as to avoid any possible ill-feeling.

Mr. Priber, for the merchants, spoke in a similar strain, adding that the side would be appreciated much more thoroughly; that they already had a fine picture for the side, and would improve it; and that while not speaking from authority, he might say that if the merchants got the side space, they might contribute $1,000 to the general fund. In answer to an inquiry, he said of necessity the merchants would do something toward fitting up the wine-room.

Mr. Epstein offered an amendment that the merchants be allotted the entire north wall, or as much of it as the committee saw fit.

Seconded, but lost.

The original motion was put and carried.

Mr. Priber stated, after the vote, that the merchants reluctantly took the space.

Plans for interior decoration were then called for.

Messrs. Wolf and Newsom, who were in waiting, were called in and their plans were examined and discussed. They were asked to submit an estimate for their plans with the center-piece left out. After a few minutes they returned and stated that their bid without the center-piece would be $2,800, Mr. Wolf being spokesman.

Mr. Wehner asked if they had any changes to offer in the design. Mr. Wolf replied negatively.

In the meantime Mr. Otto submitted his plans, specifications, and estimates. He also agreed to fit out the passageway for $75 additional, though not to put up shelves for exhibits.

Mr. Otto's bid, according to his plans, was for $2,001, substituting twenty-four stands around the sides, instead of thirty-two.

Mr. Wehner moved that the plans and specifications, as submitted by Mr. Otto, at the prices given, $2,076, including a harmonious and artistic decoration of the hallway leading to the Horticultural Building, be accepted.

The motion was seconded and carried.

Mr. Wehner moved that the Chairman be charged with communicating with Mr. Otto, and completing the contract with him in a proper and business-like manner, requiring bonds to cover the amount specified in his bid.

The motion was seconded and carried.

On motion, the Secretary was instructed to notify Mr. Wolf of this action in writing.

Mr. F. A. Haber, who had arrived some time previously, proposed that the Viticultural Building be opened with suitable ceremonies. He

PLATE V.—View in the Interior of the Weinstübe.

explained that he was going to New Orleans on the 28th, and would probably not be back until February 20th.

On motion, consideration of the proposition was deferred for the present.

Adjourned.

Minutes of the meeting of the Executive Committee of Viticultural Exhibitors, held at the office of the Board of State Viticultural Commissioners, San Francisco, February 1, 1894, at 11 A. M.

Present: I. De Turk, who presided; C. Carpy, E. C. Priber, Charles Bundschu, C. J. Wetmore, Hans H. Kohler, Henry Epstein, P. C. Rossi, and F. Korbel.

Winfield Scott acted as Secretary.

The reading of the minutes of the preceding meeting was dispensed with.

Mr. Bundschu reported that the contractor of the building was present and wanted some arrangements made as to building the stairway from the Horticultural Hall to the Viticultural Palace. He said that it was necessary that these matters be settled.

Mr. Bundschu also reported that he had agreed to pay the architect $100 for his services; that $1,500 on account had been paid the builder, on Mr. Korbel's statement that work to that amount had been done; and that the Portuguese exhibitors wanted to run an archway toward the stairs; that $61 25 would be the extra cost of fixing the passage way referred to with rough lumber.

On motion, the proposed offices and ladies' room were dispensed with.

On motion, the following action of the Building Committee was approved: Boarding the walks, $60; expense in cutting into Horticultural Building, $61 25; finishing archway, etc., in accordance with McLachlan's specifications, $236.

On motion, the Chairman of the Building Committee was instructed to go ahead with these extras.

Mr. Wolf's threats to make things uncomfortable for the committee were discussed, but no action was taken.

Mr. Scott was instructed to write for passes for the committee.

Adjourned.

Minutes of the meeting of the Executive Committee, held at the office of the Viticultural Commissioners, 101 Sansome Street, on March 6, 1894, at 11 A. M.

Present: I. De Turk, who presided; Messrs. Bundschu, C. J. Wetmore, Wehner, Crabb, Rossi, Korbel, Epstein, and Repsold; also the Secretary, and by invitation, Messrs. Otto and Baker.

Mr. Bundschu made a long verbal report from the Building Committee: that good progress was being made on the Viticultural Palace; that the building had been turned over by the builder; that some damage had been done by water leaking through the dome; that the builder claimed that certain changes made in the plans of the dome would exculpate him from damages, and that gutters were needed on the building.

After some discussion, Mr. Bundschu was, on motion of Mr. Epstein, authorized to pay the bills for construction account, reserving $600.

The question of awarding space to counties and individuals in the "Palace" was then brought up. After a discussion, Mr. Epstein moved that a committee of five be appointed to act, with the Chairman representing Sonoma County.

The motion was carried, and the following committee was appointed to act in the afternoon.

Sonoma—I. De Turk and P. C. Rossi. Napa—H. W. Crabb. Alameda—C. J. Wetmore. San Francisco—Henry Epstein. Santa Clara—Wm. Wehner.

Mr. Bundschu called the attention of the committee to the fact that Charles G. Lathrop, representing the Stanford estate, had refused to contribute to the viticultural fund; also James G. Fair, Mrs. Hearst, E. J. Baldwin, and others. He thought that the Stanford estate, which had been enriched by the wine men in part, should have been in evidence. No action was taken.

The Secretary was, on motion, instructed to write to the Director-General in regard to passes for the members of the committee who are exhibitors.

The Secretary was instructed to remind the Executive Committee and Director-General that $750 was coming to the viticultural fund for relinquishing space in the Main Horticultural Building.

On motion of Mr. Epstein, the Building Committee was empowered to retain Mr. Baker's services, to take charge of the exhibits as they arrived.

Adjourned.

Minutes of the meeting of the Executive Committee of Exhibitors, held at the office of the Viticultural Commissioners on March 15th, at 3 P. M.

Present: Mr. C. J. Wetmore, who presided; Messrs. Epstein, Rossi, Bundschu, Schilling, and West, also Mr. J. E. Baker.

Mr. Bundschu stated that the meeting was in regard to future control of the Viticultural Palace, Mr. Emory E. Smith, the Chief of the Department of Horticulture, claiming it.

After further statements by Mr. Bundschu and Mr. Baker and a general discussion, the Secretary was, on motion, directed to write to Mr. Smith, and ascertain when a committee could call on him and Mr. Haber, with regard to this matter.

The following committee was appointed to act: P. C. Rossi, C. Schilling, Henry Epstein, Charles Bundschu, and C. J. Wetmore.

Adjourned.

Minutes of the meeting of the Executive Committee of the Viticultural Exhibitors, held at the office of the State Viticultural Commissioners on April 3, 1894.

Present: C. J. Wetmore, who presided; E. C. Priber, who acted as Secretary; Henry Epstein, P. C. Rossi, A. Repsold, and Charles Bundschu.

The following programme on the occasion of opening the Viticultural Palace on April 7th was agreed on:

2:00 P. M. Overture by the orchestra.
2:15 P. M. Remarks by Charles Bundschu, Chairman of the Building Committee, on turning over the building to exhibitors.
2:30 P. M. Remarks by I. De Turk, Chairman of the Viticultural Committee accepting the building for the exhibitors.
2:45 P. M. Address by Director-General M. H. de Young, on behalf of the fair management.
3:00 P. M. Remarks by Hon. M. M. Estee (in place of Judge J. A. Stanly, declined, on account of inability to be present).
3:15 P. M. Remarks by F. A. Haber, Superintendent of Viticulture.
3:30 P. M. Lunch.

On motion, the sum of $50 was set aside for supplying lunch (sandwiches), and Messrs. Epstein and Priber were given charge of the matter.

On motion, Charles Bundschu was appointed the committee to supply the wines.

On motion, Messrs. C. J. Wetmore, Bundschu, and Epstein were appointed the committee on invitations, with power to act.

On motion, the payment of the building contractor and decorator, E. A. Otto, in full, was authorized.

The Treasurer (Bundschu) submitted a statement showing a balance of $841 in the treasury.

The San Francisco Wine Dealers' Association agreed to pay $250 towards defraying the contingent expenses of the exhibit.

On motion, a Supervision Committee of fifteen was appointed to look after the building, the members to act in sub-committees of three, each sub-committee to act one week in rotation.

April 8–14 (1st week)—Bundschu, Wetmore, DeTurk.
April 15–21 (2d week)—Priber, Scott, Parrott.
April 22–28 (3d week)—Schilling, Carpy, West.
April 29–May 5 (4th week)—Epstein, Repsold, Beringer.
May 6–12 (5th week)—Rossi, Korbel, Wehner.

Giving two members in sub-committees in the city.

The Secretary was directed to communicate with these gentlemen.

On motion, Messrs. Bundschu and Priber were appointed a committee of two to draw up rules to govern the sampling-room, and confer with Superintendent of Viticulture Haber in regard to the rules.

Adjourned.

Minutes of the meeting of the Building Committee of the Viticultural Exhibitors, held at the office of the State Viticultural Commissioners, 101 Sansome Street, San Francisco, May 1, 1894, at 11 A. M.

Present: Charles Bundschu, in the chair; and Messrs. Priber, C. J. Wetmore, Epstein, Schilling, and the Secretary; also decorator E. A. Otto.

Mr. Bundschu stated that he had been surprised, on the presentation of Mr. Otto's bill for extras, to note the size of the charges. The bill (which was duly laid before the committee) called for additional expenditure of over $1,100, and there was no money to pay them. He suggested an examination of the separate items. The main contract had been completed and paid.

Mr. Otto made a statement, in response to an inquiry by Mr. Priber, that all the extras had been ordered by either Messrs. Bundschu, Epstein, or Priber.

This led to a call for particulars from each of these gentlemen. Each said that he had expected that some extras would be needed, but all that Otto had charged for had certainly not been ordered.

Mr. Otto made a supplementary statement, stoutly asserting his position in the premises. Subsequently he admitted that he himself had been surprised at the amount of the extras.

Mr. Priber asked if it was not a fact that the committee had tried from time to time to find out what these extras would cost, and had been unable; and further, if it was not a fact that the committee would never have ordered costly extras had Otto been able to give a statement. Mr. Priber received no satisfactory answer.

A general discussion followed, in which Messrs. Bundschu, Priber, and Epstein claimed that Otto had gone ahead in many instances without authority, and in all cases without stating cost.

Finally, the matter was brought to an issue after Mr. Otto had withdrawn, by Mr. Priber moving that the bill for extras be referred to a special committee of two, consisting of Mr. Bundschu and Mr. Epstein, who were instructed to go through Mr. Otto's bill and ascertain: First, what items in it were covered by the original contract; second, what items were unauthorized; and third, what duly authorized were too high.

The motion was carried.

The committee then adjourned.

A meeting of the Executive Committee of Viticultural Exhibitors was held September 12, 1894, at 101 Sansome Street, San Francisco.

Present: Vice-President C. J. Wetmore, who presided; and Messrs. Bundschu, Korbel, H. H. Kohler, and Epstein.

The final reports of Charles Bundschu, Treasurer and Chairman of the Building Committee, and of J. R. Baker, were read and ordered filed.

On motion, a vote of thanks was extended to the Building Committee for its efficient work.

On motion, a vote of thanks was extended to Charles Bundschu for his faithful services to the cause as Treasurer and as Chairman of the Building Committee.

On motion, Mr. J. R. Baker was given a vote of thanks for his work and efficiency as Superintendent.

The question of the distribution of the funds was brought up.

It was decided to pay Mr. Baker $63 64 for his work in September, in winding up the affairs of the display.

On motion, the sum of $100 was voted to Mr. E. A. Otto, the decorator, whose claims for extra services had been compromised at a loss to him.

On motion, the sum of $100 was set aside to be expended by the Treasurer in procuring photographs of the "Palace" and interior, for the members of the committee.

There being no further business the committee adjourned.

APPENDIX D.

THE PHYLLOXERA OF THE VINE.

By VALERY MAYET.

[Translated for the Board of State Viticultural Commissioners.]

CONTENTS.

PART I.

PART II.

THE PHYLLOXERA OF THE VINE.

Phylloxera vastatrix, Planchon.

SYNONYMS.—*Pemphigus vitifolii*, Asa Fitch, 1854; *Dactylosphæra vitifolii*, Schimer, 1867; *Peritymbia vitisana*, Westwood, 1867; *Rhizaphis vastatrix*, Planchon, 1868. (See bibliography after the chapters on phylloxera.)

INTRODUCTION.

To write on a subject after so many other authors, and to summarize and recapitulate the mountains of books, treatises, memoirs, notes, and pamphlets concerning it, offers many difficulties. Such is the situation, however, of whomsoever desires to-day to write upon the phylloxera. Ordinarily when one wishes to treat upon any subject and to get at the beginning or origin of the matter, one is oftentimes at great trouble to seek out the earlier works; and on the day of publication, often too late, come other documents which the writer would have been glad to use.

However, with the phylloxera, the abundance of material becomes almost an obstacle. It is true that some researches were made in past decades, but the investigations virtually date back twenty years; but during this short period what floods of ink, what outbursts of impracticable ideas, what foolish plans have been devoted to securing the prize of 300,000 francs offered for a remedy! M. Planchon writes:*

"In order to get any correct idea in this torrent of fantastic lucubrations, it is only necessary to remember the ignorant notions that prevailed. Some said that it was necessary to have a toad buried under a stump in order to get from him the nature of the venom that would attack the phylloxera-infested vines; and people will recall how attacked vines were sprinkled and soaked with white wine or a decoction in which mauve was the principal constituent. In the deluge of processes, many of the experimenters had confounded the phylloxera and oidium, or had never seen one or the other of these parasites. The combined spoliation and silliness undermined, to a great extent, the confidence of the masses in scientific instruction. Speculations and fancies came to us from all social ranks and from every corner of Europe. The better class of those who made recommendations to the Minister of Agriculture were generally the most ignorant; and they were the most tenacious when their ideas bordered closest to folly. Happily, in proportion as observation and experience approached the problem, the dreamers passed to the background, trifling discussions gave way to a study of the facts, and useful investigations were concentrated on obscure points, letting in a full light upon them, admittedly clear by science."

Let us do the same. Let us leave on one side, as far as possible, the secondary naturalists, the empiricists, the seekers of theories and panaceas, and draw from the writings of the standard authorities. The history with which we begin will be taken, in great part, from the *Comptes rendus* of the Academy of Sciences, a valuable source of information.

*J. E. PLANCHON: *The Phylloxera Question.* (*Revue des Deux Mondes*, January 15, 1887.)

CHAPTER I.

HISTORICAL.

The order of phylloxera was created in 1834 by Boyer de Fonscolombe.*

And the first species observed at this time in the vicinity of Aix (Bouches-du-Rhone), the *Phylloxera quercus*, were found living on the oak. This insect, fixed under the leaves of the tree, produces by its attacks a partial desiccation of the leaves; and when it multiplies sufficiently, the entire leaf becomes dry. The etymology is *φύλλον* (leaf) *ξηρειν* (dry or desiccate). This is very exact as far as most of the species are concerned, living as they do on the oak and walnut, but it is different with the species which attack the vine; in its mode of life it forms an exception to the other species of the order.

It was in 1854 that the phylloxera of the vine was first spoken of; the species discovered in the United States in the galls on the leaves by Dr. Asa Fitch† was discovered by that naturalist and named *Pemphigus vitifolii*. Dr. Henry Schimer, of Philadelphia, in 1867 discovered the same gall and same insect, but this time in two different forms: the wingless gall insect and the winged insect. These were separated from the *Pemphigus* for the reason that the hairs at the ends of the tarsi terminate in a sucker, and the American naturalist called the insect the *Dactylosphæra vitifolii*. (See Annals of Society of Natural Sciences of Philadelphia.) However, in 1863 the species described by Asa Fitch had passed over the Atlantic and was found by Westwood in the graperies at Hammersmith, near London, England. The celebrated professor from Oxford met first the gall insect; but thinking of examining the roots of the vines, he discovered the root form of the insect, until then unknown. Some years afterward (1867–1868) the insect was noticed in many parts of England and Ireland. The English savant described the insect, under the name *Peritymbia vitisana*, to the Ashmolean Society of Oxford, November 21, 1867.

While the insect was thus established at many points in England, the dying of the vines from it was noticed at the same time in many portions of France, the cause not then being known. We find in the *Revue Agricole et Forestiere de Provence* of March 5, 1868, a letter written by M. Delorme, a veterinary of Arles, under date of November 8, 1867, and addressed to the President of the agricultural meeting of Aix—a letter in which it is stated that the disease was noticed in Crau-d'Arles in the month of July, 1867. M. Delorme was the first to write in any French publication of what was then called "the new disease of the vine"; but it appears that the malady had secured a foothold as early as 1863 in the commune of Pujault, Department of Gard.‡

* BOYER DE FONSCOLOMBE: *Description du genre Phylloxera.* (*Ann. Soc. Entom. de France*, 1834.)

† ASA FITCH: *Patent Office Report*, 1854, p. 79; and *Agricultural Society of New York*, 1854, p. 862.

‡ "It was about this time, between 1858 and 1862, by a singular coincidence, that importations of American roots were made at different points of Europe—Bordeaux, England, Ireland, Alsace, Germany, Portugal. It was in 1863 that the first signs began to be visible in the graperies of the United Kingdom, and then in an uncertain manner at Pujault (Gard); more clearly in Vaucluse and Bouches-du-Rhone; and still later in Germany and in Austria (at Klosterneuberg), where American vines were secured at different times." [From PLANCHON: *La Question Phylloxerique en 1876.* (*Revue des Deux Mondes*, January 15, 1877.)]

We learn the following from a note by M. de Penaurun, of Villeneuve-les-Avignon, published July 7, 1868, in the Bulletin de la Société d'Agriculture de Vaucluse. To be brief, many of the provençal agriculturists, finding their vines dying from some inexplicable cause, and having found on the dead roots traces of *mycelium*—such as there are nearly always on the dead woody tissues of the root buried under ground—attributed the disease to *pourridié* or *blanquet*, a cryptogamic malady of the vine, which is usually found in locations where the subsoil is impermeable. However, this new "*pourridié*" appeared, against all rules, among the youngest and most vigorous vines on the hillsides. Then the Société d'Agriculture de Vaucluse and M. Gauthier, the Mayor of Saint-Remy, solicited the advice and assistance of the Société Central d'Agriculture de l'Herault.

A commission, consisting of Messrs. G. Bazille, J. E. Planchon, and F. Sahut, were duly appointed, and on July 15, 1868, they met on the grounds of the Chateau de Lagoy, near Saint-Remy. They examined with much care the roots of the affected vines, and speedily the discovery was made by M. Sahut, of a confused mass of little yellow insects, which M. Planchon recognized with the glass as connected with the *cochenilles* and the *pucerons*. Returning to Montpellier, and aided by M. Donnadieu, zoölogical preparer for the Academy of Sciences, M. Planchon examined the insects with the microscope, and the provisional name of the insect was decided upon as *Rhizaphis vastatrix*. A note was shortly afterward drawn up and sent to the Institute.*

The first publication was made, however, in the report to the Société d'Agriculture de l'Herault, published by the *Messager du Midi* of July 22, 1868, and signed by the above three delegates.

The cause of the disease is thus recalled: "After two days of investigations," says M. Planchon,† "we found the insects in a hundred places, in all of which the vines were suffering. At that moment one cardinal fact was established: the disease is caused by an almost invisible insect, hidden under the ground, multiplying by myriads, and exhausting the roots of the most vigorous vines. But the insect. Whence came it? How is it to be described? To what is it most nearly allied? These questions were not easily to be determined at once; all the forms of the insect's life could not be found at once.

"Having at that time seen only the insects living below ground, and without wings, I sought persistently for the winged form, which I supposed must exist. This form did exist, and having discovered the nymph I saw it produce on August 28, 1868, an elegant little winged insect, with four transparent wings, spread flatly."

The insect submitted by Messrs. Planchon and Lichtenstein to the noted hemipterist, M. Signoret, was assigned by him to the order of *Phylloxera*,‡ created by Boyer de Fonscolombe for the *Phylloxera quercus*.

"Thus," continues M. Planchon, "my *Rhizaphis* was assigned to its true order. It now remained to identify the insects with the American variety. The first step in this direction was the result of a happy accident. On the 11th of July, 1869, while traveling with a commission from the Société des Agriculteurs of France, I discovered at Sorgues

* J. E. Planchon, G. Bazille, and F. Sahut: *Comptes rendus, Acad. des Sciences*, meeting of August 3, 1868, page 333.

† J. E. Planchon: *Le Phylloxera en Europe et en Amerique.* (*Revue des Deux Mondes*, February 1, 1874.)

‡ Signoret: *Bulletin Soc. Entom. de France*, September 23, 1868.

(Vaucluse), on two vines of the vine called the Tinto, many galls like those of the American *Pemphigus*."

According to Dr. Plumeau,* it was M. Laliman who was first to find the gall insect in France, on American vines. We mention this as a matter of history; but in fact it is a matter of little importance to science and to viticulture whether the gall form was found first at Bordeaux or Sorgues, and in both cases it can be said that the discovery was nearly simultaneous. In the spring of 1869, J. Lichtenstein was the first to advance the theory that the root phylloxera was a subterranean form of the *Pemphigus vitifolii* of Asa Fitch; a simple hypothesis, which was speedily accepted, and of which Planchon, himself, was not slow to accept the responsibility. (*Mess. Agr. du Midi*, September 5, 1869.)

While these studies were being prosecuted by us in France, Westwood had continued his observations in England, having received insects from France and the United States, and in a paper appearing in the Proceedings of the London Entomological Society, February 1, 1869, he identified his *Peritymbia vitisana* of 1867 with the insect called *Pemphigus vitifolii* by Asa Fitch, *Dactylosphæra vitifolii* by Schimer, and *Phylloxera vastatrix* by Planchon.

In spite of some protests coming from partisans of the priority of nomenclature, this last name has been adopted by science for three reasons: First, as the name of priority, the order of *Phylloxera* dating from 1834, it cannot be changed; second, the qualification *vastatrix* (devastator) is better than *vitifolii* or *vitisana*, as conveying the idea of an insect destroyer *par excellence;* third, the name has the advantage of general usage, and the recognition of the press of the entire world.

In 1870, Professor Riley, who then lived at St. Louis, Mo., established: First, the identity of the gall insects found in Europe with those of America; second, the identity of the gall and root types of the insect.†

These observations, confirmed in 1871, at the time of a visit of the American savant to France, are no longer debated or questioned.

As the knowledge was in 1870, so was it also in 1873. During these three years, in spite of the attentive study of a large number of naturalists, the cycle of metamorphoses was not completely known. The sexual form, which exists in all aphidians and lays the winter egg, could not be wanting in the phylloxera. At first it was thought that the winged insect was the sexual form.‡

The error was excusable, the males of certain pucerons and of the *Phylloxera quercus* being ordinarily provided with wings; then it was noticed that with the *Phylloxera vastatrix* all the winged insects laid eggs, and laid without any coupling. * * * The sexual form—so remarkable in the fact that it does not have a sucking apparatus—was then discovered on the phylloxera of the oak by M. Balbiani,§ and then, following this, that of the vine by Max Cornu,‖ who, nevertheless, observed only two females. This study having been continued in 1874 at Mont-

* Dr. Plumeau: *Association Française pour l'Avancement des Sciences*, 1872, session at Bordeaux, page 636.

† American Vines, by Bush & Meissner. Translated from English by L. Bazille, and revised and annotated by J. E. Planchon, 1876; 2d edition, 1885.

‡ Dr. Schimer: Proceedings of the Academy of Natural Sciences of Philadelphia, November 1, 1867, pages 2 and 11; also, Signoret: *Le Phylloxera Vastatrix.* (*Ann. Soc. Entom. de France*, 1869, page 549.)

§ Balbiani: *Comptes rendus de l'Academie des Sciences*, October 20, 1873, page 884.

‖ Max Cornu: *Comptes rendus*, November 3, 1873, page 1015.

pellier by M. Balbiani,* male and female insects were just seen to leave the shell of the eggs laid in captivity by the winged insects. In the month of August, 1875, M. Boiteau discovered the place where the winged insect ordinarily lays its eggs.†

It now remained to study the sexual forms with a certain number of individuals normally born; to observe their coupling, and in like manner their laying, and finally to secure the winter eggs. In accordance with observations made upon the species peculiar to the oak, these must be hidden in the bark of the stock. That is what Balbiani succeeded in discovering in the month of September of the same year. Commodiously installed at Libourne, with M. Boiteau, in a laboratory well provided with microscopes—a laboratory which I know well from having investigated the question of the winter egg in 1878—M. Balbiani brought to a good conclusion his delicate operations, and closed the gap in the cycle of the metamorphoses of the *Phylloxera vastatrix*.‡

At the same time was published by M. Balbiani the results of his beautiful observations on the gradual degeneracy of the ovaries of the phylloxera—a degeneracy which, accentuating itself from generation to generation, can result in the sterility of the insects, but which ordinarily terminates in the production of the winged insect (and then the sexual insect) which lays its single egg. The fecundation of this egg by the coupling of the sexual insects being, according to the author, the point of departure of a new fecundity, he arrives at the conclusion that the complete extinction of a colony of insects might be accomplished by the destruction of the winter eggs each year by a treatment of insecticides.

From 1875 to 1881 his studies were continued. In a series of papers to the Institute, sent by M. Boiteau,§ the place of the laying of eggs by the sexual insect was determined, the phylloxera were observed leaving the winter egg, and their settling first on the leaves and then on the roots was demonstrated by experience.

Not one salient fact has come to weaken the work of M. Balbiani. Winter eggs have been found numerously at Libourne by M. Boiteau; but whatever confidence which one has in the observations of the learned Professor of the College of France, science has not yet completely adopted his conclusions. M. Lichtenstein and ourselves have observed in Languedoc, under favorable circumstances, the laying of the winged insects and the hatching of the sexual; the winter egg has been obtained by us in many cases in our laboratory at l'Ecole de Agriculture of Montpellier,‖ but the observation on vines in open air of the laying of the sexual insects is wanting in the Gironde. In spite of the conscientious observations of Messrs. Planchon, Lichtenstein, and Mares; in spite of my own work since 1877 at Montpellier, after having been many times to Bordeaux and Libourne to study the question, with M. Boiteau as guide; in spite of a special mission in Herault intrusted to M. Boiteau in 1878 by the Minister of Agriculture; the fecund egg continued to baffle all the seekers. Is it the same in dry countries as in wet ones? Does it ever

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* Balbiani: *Comptes rendus*, August 31 and December 14, 1874.

† Boiteau: *Interet public de Libourne*, numbers of September 2, 9, and 16, 1875; and also, Balbiani: *Comptes rendus*, October 4, 1875.

‡ Balbiani: *Comptes rendus*, October 4, 1875, and July 17, 1876.

§ Boiteau: *Comptes rendus de l'Academie des Sciences*, May 10, June 5, July 8, August 5, and November 6, 1876.

‖ Valery Mayet: *Comptes rendus*, November 2, 1880.

hatch before winter? This last question is found in most writings on phylloxera,* and when Mr. Graëlls, Professor of Comparative Anatomy at the University of Madrid, announced, in September, 1878, at the Viticultural Congress at Montpellier, that he had seen on August 8th, at Malaga, winter eggs laid in July hatch on the former date, this question appeared to be decided in the affirmative.† "M. Graëlls," said M. Planchon, "is a savant whose eye and judgment are above suspicion when he makes a statement as to what he has seen."‡

No one could doubt the good faith of M. Graëlls, and our personal and friendly relations with the Spanish savant are such that we can affirm his faith in the premises; but in observations as delicate as these are, in which it is necessary to precede the investigations by long and minute work with the glass, and afterward isolate by microscopic examination all the invisible corpuscles which to the naked eye resemble an egg, has he done all this with requisite care?

"In order to make my investigations," writes M. Graëlls (*Journal de l'Agriculture*, 1880, page 106), "I brought from Malaga to Madrid the roots of phylloxerated vines. Losing hope of finding the winter egg with the glass, in the manner of M. Boiteau, it occurred to me to shake the dried roots over a white paper on a table. In examining with a glass, the detritus obtained, I found some eggs of the sexual insect, easily recognizable by their singular character. Placed where they could be observed, they hatched, some in about three or four hours; others somewhat later."

The studies in Languedoc were then considered useless by certain naturalists. Lichtenstein—not to mention one better known—abandoned them completely, though he was likely to bring them to a satisfactory end. "You lost your time," we said to him. "Seek and you will find," we wrote, on the contrary, to M. Balbiani. Confident in the work of the savant who was the first to find the fecund egg in the Gironde; convinced ourselves that as far as France was concerned the experience at Madrid was in nowise conclusive, we continued the search, and on March 16, 1881, we found the winter egg at Montpellier,§ on the property of Viviers, with M. Pagezy. We found them in sufficient quantity to satisfy all observers, Lichtenstein the first of all, who found them himself on our advice as to how to work.

On this occasion we received a visit from M. Henneguy, delegate of the Academy and assistant as preparer for M. Balbiani of the College of France, and who was at that time engaged with M. Mares on the property of la Paille at Montpellier, in experiments to ascertain if the fecund egg could be completely destroyed by the use of insecticide lime washes.‖ The point to which we wish to draw special attention is that we wish to guide one surely in the study of the winter egg; and that the gall insects are observed annually at the same point; and that by the removal of the gall insects, covering a period of years, all the world can judge the efficacy of the process. At the end of 1886 the lime wash had not been applied; the galls reappeared in 1887. At the end of 1887 the lime wash

* PLANCHON: *La question phylloxerique en 1876.* (*Revue des Deux Mondes*, January 15, 1877, page 30.)

† See on this subject—LICHTENSTEIN: *Le Phylloxera en Espagne* (*Journal la Vigne Americaine*, 1879, page 208; also, GRAËLLS: *L'oeuf d'hiver du Phylloxera* (*Journal de l'Agriculture*, 1880, pages 27 and 102); also PLANCHON, *Vigne Americaine*, 1880, page 70.

‡ PLANCHON: *Vigne Americaine*, 1880, page 120.

§ VALERY MAYET: *Comptes rendus, Academie des Sciences*, March 28, 1881.

‖ BALBIANI: *Comptes rendus*, April 10, 1882, and October 20, 1884.

was renewed; there were no galls in 1888, except on the marked vines.

M. Graëlls, nevertheless, has not yet surrendered, and in his latest work on the Aphidians (*Cuestiones biologico-ontogenicas y fisiologicas de los afidios*, Madrid, 1887), he persists in regarding his experiments as conclusive. However, we will consider our own observations as conclusive—at least as concerns France and the greater portion of Europe; the subject of summer hatching is not supported, however, except in Spain.*

We will say nothing of the conditions in Andalusia, and still less of those in tropical countries. It is certain, however, at Panama, for example, where M. Collot, Professor at Dijon, has proved the existence of the phylloxera on the leaves of the *Vitis caribæa*—leaves which were carried to M. Planchon—the eggs do not act the same as those found in Europe. The silkworm of the mulberry offers us a phenomenon going to support this hypothesis. Its eggs, according to M. Duclaux, do not hatch normally in temperate countries, unless they have been submitted to the influence of cold; that is to say, after winter or after they have been submitted for one or two months to artificial cold. As against this, in warm countries, India, for example, the eggs hatch without being ever submitted to the action of cold, and produce many generations in a year. The silkworm of multiple generations in a year is rare in France, is more frequent in Italy and Spain, and is the rule in tropical countries. In India the hatching is in February, June, and October.

CHAPTER II.

PROGRESS OF THE PEST.

Originating in America, or more properly speaking, that part of the United States situated east of the Rocky Mountains, the phylloxera was strongly established toward 1869 in the southeast and southwest of France. The two points of introduction—two collections of American vines, one at Roquemaure (Gard) and at Floirac, in the immediate neighborhood of Bordeaux—have been determined and formed two infected spots, from which the disease radiated rapidly with a tendency to converge, one toward the other. In 1870, the departments of Gard, Vaucluse, Bouches-du-Rhone, and Var were completely invaded, and Herault was attacked in one of its richest vineyard districts, the plain of Lunel. From 1871 to 1876 nearly all the vines about Montpellier were destroyed, and those of Beziers were touched. At the same time, toward the north, the enemy having ruined the celebrated vineyards on the hillsides of the Rhone, beset Lyons and numerous points, pushing to Beaujolais. In 1878, the invasion reached the departments of Alpes-

*In France there has lately been evolved a theory, which we will call a "mixed theory," which, however, has as yet only been admitted by its author, M. Donnadieu, of whom we have already spoken, and who was the first to study the phylloxera with the microscope, with M. Planchon. He speaks, in a paper to the Institute (*Comptes rendus*, May 9, 1887), of fecund eggs which go through the winter, and of others which are hatched in the autumn. These two varieties of eggs, he claims, are laid by two different forms of phylloxera. We are awaiting a later work announced by the author, a work which is expected to clear up certain points in his observations, and which we are not yet able to seize with precision.

Maritimes, Aude, Pyrenees-Orientales, Aveyron, Puy-de-Dome, Ain-Saône-et-Loire, Cote d'Or, and the island of Corsica.

In the west, the progress of the pest, though somewhat slow at first, was very rapid after 1872. The Medoc and the Sauternes, the *graves*, mixed with sand, offered a certain resistance to invasion; but the *palus*, "Entre-deux-mers," Lot-et-Garonne and Dordogne, with their more argillaceous soils, and above all the Charentes, with their light, chalky soils, shallow, and easily cracking in summer, were soon seriously attacked, and about 1879 completely ruined. In 1880, on the official chart, published every year by the Minister of Agriculture (and on which the attacked districts were tinted light or dark, according to the severity of the attack), the two great sources of the disease were shown as having joined, going across Lot, Gers, Tarn-et-Garonne, Haut Garonne, and Tarn. In the north the disease reached Loire by Indre, Loir-et-Cher, and Loiret. In the last charts published, the department of Seine-et-Marne is given as attacked; and to the great dismay of the viticulturists in the immediate vicinity of Paris, the phylloxera has been discovered on the vines on the lattices of the National Agricultural School of Grignon (Seine-et-Oise). In the basin of the Rhone all departments in which vine growing prevails have been invaded. In Corsica, the disease has been found in the arondissements of Ajaccio, Corte, and Bastia. At the hour we write, more than a million hectares have been attacked in France, and among all our great vineyard-growing districts, the Champagne district alone in yet untouched, though it is menaced strongly by the infected points in Seine-et-Marne.*

In Algeria, in spite of the fact that the law of 1881 ordered, as in Switzerland, the complete extinction of attacked spots, the pest has appeared in Sidi-bel-Abbes, Tremcen, Oran, Philippeville, La Calle, Souk-Arras, and measures taken for its extinction.

In foreign countries, as well as in France, it was the American vines which, in the beginning, introduced the phylloxera. In the valley of the Douro, in Portugal, many of the vines had died before the insect was discovered. Its presence, proved in 1870, appears to have followed an importation of American vines in 1863. In Spain, the two great points of infection—Malaga in the south, known since 1877, and Gironde in the north—appear, however, to have originated with some vines from France. The first point of attack in Switzerland, noted in 1874 with M. de Rothschild at Pregny, came from infested vines received from the English graperies, and the phylloxera at Neuchâtel came from the German nurseries at Annaberg; to-day, in spite of the energetic enforcement of the law referred to above, the disease has reached the vineyards of the canton of Vaud, and at one point in the canton of Zurich.

In Germany the numerous affected spots in the valley of the Rhine have had their origin in the nurseries and collections of vines of Annaberg, Erfurt, Bolweiller, Plantreres, etc.

Austria and Hungary must have received the pest in 1868 with some vines imported from the United States, the first points of invasion being Klosterneuberg, Pantchowag, and Fünfkirchen.

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* Since M. Mayet wrote, the Champagne district has been invaded, and, although strenuous efforts have been made to dislodge the pest, it is likely to retain its foothold and spread, on account of the disinclination of the smaller vineyard owners to join in measures to stamp it out, until too late.

The discovery of phylloxera in Italy (at Valmandrera, province of Como, and Agrate, province of Milan) dates from 1879. In 1880 new spots were discovered at Port Maurice, Riesi, and Messina, and in 1882 in the neighborhood of Girgenti and Catanina.

Crimea and the Caucasus, the two leading vineyard sections of Russia, have been infected since 1880, and Bessarabia since 1886, from the introduction of roots coming from Erfurt, in Germany.

In the Danubian provinces of Roumania many points of attack have been reported in the vicinity of Jassy and Galatz (Moldavia).

In Turkey in Europe and Turkey in Asia the introduction of the disease dates from 1885; but it has already become widely spread.

Greece, alone, at this time, appears to have had immunity; but it will not be long, no doubt, before that country is invaded.

Outside of Europe, the vines of Madeira are destroyed, and those of Cape Colony are strongly touched. Australia, which has frequent communication with the United States, has had phylloxera since 1875. Lastly, California, the only section of the United States in which the European vine succeeds, is seriously affected. Many of the vineyards are destroyed and the Mission vines have suffered and the vineyardists have begun to reconstitute their vineyards with American stock.

CHAPTER III.

LOSSES OCCASIONED IN FRANCE BY THE PHYLLOXERA.

Before describing the insect, we will give here some particulars as to the losses which have followed its introduction into our country. As far as concerns countries outside of France, we do not have the documents at hand; but as regards France, an article published in 1888 by M. Lalande, Deputy from Gironde, appears to present the situation in its true light, and we deem it useful to reproduce his remarks here.

"Few persons," says M. Lalande, "have formed any sufficient idea of the losses sustained by France in consequence of the ravages of the phylloxera. The following statistics, based on the report of the Director of Agriculture to the *Commission Superieure du Phylloxera* for the year 1884, contain some elements from which these losses can be appreciated.

"According to this report the area of vines in France destroyed by phylloxera up to the end of 1884 was upward of 1,000,000 hectares, passing this estimate a little. But this is not all. Aside from vineyards entirely destroyed there were others affected, but still living. This area is estimated at 664,511 hectares.

"It is very probable that it is under the truth if we estimate this area of affected vines as the equivalent of 200,000 hectares of vineyards entirely destroyed.

"The actual loss is therefore 1,200,000 hectares of vines actually destroyed—that is to say, half of the vineyards of France.

"From these statistics what is the actual money loss of these 1,200,000 hectares? Here we must make an observation which appears to us of very great importance. The value of the destroyed vines is generally computed according to their actual selling price; but viewing this from the point of their value to the nation, this is under the actual value.

"As a matter of fact, the actual selling value is based on the annual net revenue, but the value of vineyards from the view of the nation is much above this. The value is based on the gross revenue, which can be resolved into two parts: First, that which is necessary to pay salaries and different costs of cultivation; second, the excess, which constitutes the net revenues.

"It is evident, considering the common weal, that these two elements can be confounded. However, all things considered, we believe that the actual value of the vineyards destroyed in France is estimated at an average of 6,000 francs per hectare."

(But if, after the considerations above stated, one wishes to take a basis from which to calculate the gross revenue, the value of the vineyards must be estimated as considerably above 6,000 francs per hectare.)

"In truth, after the vineyards are gone, there still remains the value of the bare soil; but in France this value is generally very small, most of the vineyards being planted on land but little suited to other purposes.

"Everything considered, and exaggerating nothing, I will adopt as a basis of calculation the estimate of 6,000 francs per hectare given above, and we thus reach the sum of 7,200,000,000 francs as representing the actual money loss sustained by France from vines destroyed by the phylloxera.

"Nor is this all. To this loss of actual capital should be added the loss of salaries and other revenue sustained in consequence of the loss of the vines. This is difficult to calculate. But we will be under the truth if we take as a basis for an estimate the value of the wines and dried grapes that France has imported—the latter to be made into wine—since the destruction of our vineyards. These importations, as will be seen, are upwards of three milliards of francs.

Importation into France of Vins Ordinaires and Dried Grapes from 1875 to 1887.

Year.	Vins Ordinaires.	Dried Grapes.
	Fr.	Fr.
1875	8,351,741	5,755,614
1876	18,468,811	5,447,207
1877	22,593,989	8,649,482
1878	50,204,145	14,829,096
1879	107,479,899	40,807,043
1880	297,917,248	62,631,970
1881	346,516,425	37,364,289
1882	295,207,947	31,903,068
1883	360,000,000	39,000,000
1884	319,664,326	49,644,909
1885	361,476,079	95,350,824
1886	489,985,194	88,422,465
1887	545,000,000	98,000,000
Totals	3,222,866,504	577,805,984

Résumé.

	Fr.
Vins ordinaires	3,222,866,504
Dried grapes	577,805,984
Total	3,800,672,488

"We thus arrive at the estimate of upward of 10,000,000,000 francs as the total loss caused by the phylloxera in France in consequence of the phylloxera."

There is no question that in the foregoing article, written by one of the leading merchants of Bordeaux, gives a true estimate of the *passive* loss sustained by France, if I may so express myself; but in the *actual* loss, which includes the cost of reconstituting the vineyards, the estimate is too low for the burden which our national economic situation now sustains and will sustain for a long time.

On consulting the statistics published by the Director-General of Agriculture in 1888, we find that the vineyards successfully defended from the phylloxeria or re-constituted are no greater than 268,207 hectares; place it at 300,000 hectares, certain vineyards in sandy soils not having been included in the above statistics. What, in fact, is this to the 1,200,000 hectares destroyed? Scarcely a quarter, from which can be deduced the expenses for re-constitution.

We say, then, with M. Lalande, that "far from being astonished at the gravity of the losses sustained by the country, we should rather be surprised that they are not greater, following such a disaster."

CHAPTER IV.

DESCRIPTION AND BIOLOGY.

The description of the *Phylloxera vastatrix*, and of its habits, can be found in numerous works, good or bad, on the details of which we will not enter at this place; we will merely say that aside from certain documents drawn in the *Comptes rendus* of the Institute, and some other works, these different books are all more or less written from two important works—those of Max Cornu and M. Balbiani. The first, which appeared in 1878 (Paris, *Imprimerie Nationale*), entitled *Etude sur le Phylloxera Vastatrix*, contains principally the detailed history of the first three forms of the insect known. The second, published in 1884 (Paris, *Imprimerie Nationale*), entitled *Le Phylloxera du Chêne et le Phylloxera de la Vigne*, gives in detail the particulars of the sexual form and its single egg—the winter egg. These two works together form a masterpiece, in fact what might be called a classic. All authors have drawn upon these works. The remarkable drawings of M. Cornu, for example, have been reproduced alike in France and in foreign countries; we will ourselves draw upon them frequently, referring our readers to these two sources for numerous details which cannot be entered into in a work necessarily condensed as this one is.

The phylloxera appears normally in four different forms, one succeeding the other, always in the same order and always with a decreasing number of eggs.*

* This diminution of fecundity is observed not only in the evolution cycle, but in the many generations which succeed each other in the gall and root forms of the insect, so that the insect would become extinct of itself after some generations were it not for the regeneration of the race by the fecund egg. Such is the theory, proved by observation, which has been developed for a long time by M. Balbiani in the *Comptes rendus* (October 4th, and July 17, 1876), as well as in his book on page 3. From this one can conceive of the importance for destroying the winter egg. Certain naturalists, Lichtenstein among others, have opposed this idea; but a trifle carried away by polemical ardor, we believe

These four forms are—

The Gall, or form of multiplication.

The Root, or form of devastation.

The Winged, or form of colonization and extension.

The Sexual, or form of regeneration.

The gall insect, in the first generation at least, lays five or six hundred eggs; it is the insect that multiplies the race. The root insect lays a hundred or so eggs, but it is *par excellence* the destructive form of the insect and the one which kills the vine. The winged insect is the one which goes afar to spread new colonies, and lays from one to eight eggs; and the sexual insect, from which the entire race is regenerated, lays its single fecund egg after coupling.

The first three forms reproduce themselves without coupling; that is, by parthenogenesis. The sexual form consists of males and females. The unique egg which they produce was called the winter egg by its discoverer, M. Balbiani. It constitutes the point of departure and the point of arrival of the evolutive cycle of the phylloxera. It is with its description that we commence.

CHAPTER V.

WINTER EGG.

This egg is laid by the sexual female under the most adherent bark of the vine, principally that of the wood two years old, and as indicated by Boiteau, preferably when the bark is a little dehiscent at the section of the last pruning. It was there that we usually found it at Montpellier. (See *Comptes rendus*, March 28, 1891.) We have also found it on the wood three years old. M. Balbiani and M. Henneguy have also observed it, but less frequently, on wood of all ages. The egg is attached to the wood by a little pedicel, and is placed between two salient fibers, sometimes affixed to the wood and sometimes to the bark itself. This pedicel, which has been given as a principal characteristic, is not always visible, but one can mark the fecund egg to a certainty by a little reddish-brown point situated on the side opposite the pedicel, and which is nothing but a micropyle or little opening, through which the spermatozoa have penetrated in order to complete the operation of fecundation. (See on this subject the book of M. Balbiani, plate V, figures 5 and 17.) As these figures concern the phylloxera of the oak and not that of the vine, the phenomenon is the same in the two species. (See also the same work for information concerning the anatomical details of the winter egg and the particulars of its embryonic development.)

The agamous eggs, which do not have to be fecundated, do not have a micropyle. The winter egg is from 0.27 to 0.30 of a millimeter long and from 0.10 to 0.12 of a millimeter in width; that is to say, is just about invisible to the naked eye. It is cylindrical and not ellipsoidal, as are the eggs of the agamous forms. Immediately after it is laid it is of a

their experiments are perhaps wanting in necessary care. More important are the latest observations of M. Boiteau (*Comptes rendus*, July 18, 1887), who for six years cultivated the growth of the root form, and who, after reaching the twenty-fifth generation, found individuals very prolific.

very brilliant pale yellow. On the following days the color deepens and brown spots appear upon it, appearing as a reticulated design in relief, which are, according to M. Balbiani, the imprint of epithelial cellules lining the ovary of the mother. Then the color becomes dark olive green, less brilliant, which holds throughout the winter, and which makes a search for the egg very difficult. At the end of February or in the first days of March it turns an amber yellow, glossy and very brilliant, and at this period the egg is very easy to be seen. Following this development the dimensions of the egg become greater, that is, 0.35 to 0.37 of a millimeter in length and 0.16 of a millimeter in breadth.

In Bordelais, according to M. Boiteau, the egg hatches in the second fortnight of April. At Paris, M. Balbiani, who was without doubt working in his experimental laboratory, has seen the young on the 9th on wood brought from Libourne by M. Boiteau. At Montpellier, the first hatching was observed by us between the 25th and 30th of March in the open air, while in experimental work the eggs appear to be hatched by the 15th of April. These dates are certainly open to modification, according to the condition of the weather. Some days before the hatching the eyes can be seen through the different envelopes which constitute the shell of the egg, in the form of two red spots situated at the end, and at this same end, equally distant from the two eyes, can be seen a semicircular black line, which is nothing else than the special organ which can be seen on the agamous eggs, and which has been compared by M. Cornu to a dentalated crest. This organ is for the purpose of splitting the shell of the egg at the moment of hatching. After the insect has left the shell the shell remains open at its anterior portion. (See Cornu, page 196, plate XVII, figures 5, 6, and 8.) Is the winter egg ever found upon the roots? M. Balbiani (*Comptes rendus*, November 2, 1874) says he has seen it at the same time as the sexual female. Dr. Fatio, of Geneva, believes that he has found the fecund egg on the roots of a vine cultivated in a separate vessel. This latter observation, it seems to us, wants desired accuracy. And further, Dr. Fatio, in his description of this egg, does not mention the little red point of the micropyle, *its infallible characteristic*, and it may be that the phylloxera does not possess its normal condition when the vine is cultivated in a pot or vessel. The case noted by Balbiani is isolated, according to the author himself, who says that everything indicates that this generation is exceptional. * * * In order to find the fecund egg it may be said at first that it is necessary in order to succeed to acquire the habit of minute investigation with the glass. It may be said that the month of March is the most favorable for making any search for it, as the color of the egg at this period is much brighter than during the winter.

CHAPTER VI.

THE GALL INSECT.

From the winter egg the gall phylloxera is produced. This is the experience of all observers up to the present time, and we will refer all readers of this subject to the observations of M. Boiteau. (*Comptes rendus*, April 27, May 10, June 3, and July 8, 1876.) Some observers

have ineffectually attempted to say that the root phylloxera is produced directly from the winter egg; but as a matter of fact the insect produced by this egg goes first to the leaves. This young phylloxera chooses always the most tender leaf; that is to say, the one last unfolded. Sometimes it takes the young shoots as they appear, and places its sucking apparatus on the upper side of the limb. (See Balbiani, page 29.) In about twenty-four hours a depression is formed and the gall commences to appear on the opposite face. The depression on the upper face becomes deeper and deeper, and the gall dilates itself from the interior into a roundish cellule. The upper orifice on this cavity is in the form of a crack (plate I, figure 1), furnished with stiff hairs, which cross each other and disposed in such manner that the passage closed to entrance is open to exit. The interior of this cellule is round and glossy. The insect which is inclosed absorbs easily the juice of the parenchyme in which it reposes. Exteriorly, that is to say, on the leaf, the excrescence is unequal, warty in appearance, covered with longer and more irregular hairs than those of the leaf. The structure of the gall, thickened by some millimeters, is due to the hypertrophy of the cellules of the limb; it is poor somewhat in chlorophyl, and is often reddish in color. "One can ask," says Cornu, "what portion of the thickening of the normal leaf is due to this new formation? Is it due to the production composed of prismatic cellules perpendicularly arranged to the plane of the leaf, or is it due, on the contrary, to the hypertrophy of the parenchyme of the underside of the leaf?" The disposition of the vasculary fascicles of the leaf permit us to answer this question. It shows that the portion above and below is hypertrophied.

The galls are found in the tissue which is being developed. The leaf is already started when the phylloxera is born, but not being more than a centimeter in diameter is in the best condition for the growth of the galls. The insect never fixes itself on developed leaves. At the place where it begins to suck, the cellules, in consequence of the constant absorption of the juice, are stopped in their development, and there results a modification of other cellules of the leaf, not attached and situated on the other face of the leaf. These cellules grow to various lengths, and by a very simple mechanism the insect ends by being inclosed in the cavity. The galls are not only found on the leaves but sometimes on petioles and even on the green stems which are growing at the extremity of the vine.

"In this case the galls take on," says M. Cornu, page 32, "the form of a wart, hollowed at its apex and having an elongated opening. There is sometimes a sort of a crack with parallel borders somewhat swelled and raised up. This crack may be more or less gaping; it is always furnished with numerous hairs. One can see in the interior of the cavity the phylloxera surrounded by eggs. The number of eggs is sometimes greater than those which could be contained in the little cavity where the insect lies. Those produced last crowd the older ones to the exterior of the border of the cavity. The galls take on larger size as the leaf becomes developed. They attain the size of 4 to 5 millimeters in thickness, and the interior cavity sometimes measures 3 millimeters in diameter."

Often at the time of the vintage certain of these galls, more developed than the others, contain two, three, or even four gall insects. They are generally laying insects, which in place of emigrating are fixed at the

place where they were born, utilizing in common the gall formed by the mother. The body of the mother insect is generally found surrounded by the brown shells of its eggs. When the body of the mother is not there many of the young will be found established side by side on the leaf and the galls may be joined together. If the leaf does not grow the galls are abandoned. If no longer submitted to the attack of the insect, the excresence takes on a special form, elongating to a sort of petiole, which tends to lengthen the blade of the leaf.

The phylloxera which issues directly from the winter egg has a peculiar aspect, and unites in large degree the general characteristics of the gall form. It is on this that we will give a description of the gall.

"It resembles," says M. Balbiani, "its mother; but it differs from it when young by being of smaller size and having its digestive apparatus well developed; when of adult age it has a large number of oviparous cavities (45 to 50). It is always easy to distinguish it from the young of the ordinary gall insects by the last article of the antennæ, which is fusiform. Another peculiarity of its organism is in having its sucking apparatus lodged in a deep depression of the ventral side of the body. Its average size is 0.40 of a millimeter in length and 0.16 in breadth. The two lateral hairs of the last article of the antennæ are placed one behind the other; the terminal hairs are a little longer than those of its mother, and the olfactory orifice is small and oval. In the first generation (the insects produced by the first gall insect) the third article is still fusiform; but the two lateral hairs are closer to each other, the terminal hairs longer, and the olfactory orifice is elongated longitudinally. In the following generation (the grandchildren of the first insect) the third article is enlarged, and the last lateral hair is placed to almost the same level as the other one. Afterward the third article has all the characteristics of the root form." * * *

We will add that the gall form (Figure 8 is apterous and always agamous; that the body is rounded, attenuated at the back; that it is yellowish, bordering on green in color; and that the back does not carry the tubercles so characteristic of the root form. It is larger than the root form—a millimeter and a quarter long by a millimeter broad—the root form not being larger than a millimeter long. On account of its great ovarian development the gall insect is thick and round. The eyes are rudimentary, formed of three ocelles, reddish in color, placed in shape of a triangle and back of the antennæ. The legs, the antennæ, and the head (sucking apparatus) are relatively short. The legs are made up of the thigh, the tibia, and the tarsi; the latter, after the second moulting, being formed of a single article, terminated by a double hook. The antennæ—the organs of feeling and smell—are composed of three articles, the first two short and thick, the third long.

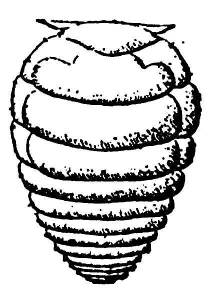

Fig. 8.
Gall Form.

The sucking apparatus is composed of four stylets. * * * When the insect wishes to suck, the two exterior stylets attack the parenchyme perpendicularly to the plane of the blade, and the juice goes into the digestive apparatus by capillary action.

The stigmates, or breathing orifices, are very difficult to see, and number six pairs, placed laterally under the ventral part—one pair under the pro-sternum, one pair under the meta-sternum, and four much smaller pairs on the first four abdominal segments.

After arriving to a perfect state—which requires about fifteen days, the insect undergoes three moultings, the latter two of which may represent the transformation from the larva to the nymph, and the nymph to the perfect insect.*

Always three shells can be found within the gall.

Once fixed the gall insect does not move, but remains immobile at the bottom of its gall, and as soon as the third moulting is over it begins to lay. In the period of three weeks, or thereabouts, five or six hundred eggs are laid in the gall and accumulate about the laying insect; but this number of eggs can never be found at one time, for after eight days have passed the hatching begins and the young begin to leave, this being when the laying is scarcely half done. The ability of the young to move is great. They move, according to M. Boiteau (*Comptes rendus*, June 5, 1876), 13 to 14 millimeters a minute, or about 80 centimeters an hour. They start for the young leaves at the extremity of the canes. In the generations which follow the first—up to October sometimes as many as seven can be counted—the reproductive faculty diminishes progressively. While with the first generation five or six hundred eggs are laid, the last generation will not produce more than one or two hundred, the number decreasing successively with every generation from the first. This is conformable with the theory of the degeneracy of the ovaries of which we have spoken.

In October, or later, in November, that is to say, with the first frost and cold, the laying insects die with the leaf, and all the young leave the galls and go to the roots, where they hibernate all winter without eating. In the spring they attack the rootlets, and are then the veritable root insect. Added to this, very frequently, after the third generation of the gall form, a great number of the insects go to the roots and become the true root insects in the first year of the cycle of life.†

The insect in going from the gall to the root follows ordinarily the cane and the stump; sometimes, also it falls from the leaf.

The eggs are ellipsoidal, about 0.30 of a millimeter in length; at first a bright yellow in color, but turning reddish-brown and brown as the embryon is developed.‡

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* Certain authors consider all the agamous forms of phylloxera as larva (even the winged form), and only give the name of insect to the sexual form, as this alone produces an egg normally fecund. We do not adopt this manner of conception of the cycle of the phylloxera—not that the idea of larva laying eggs would interfere, however, for there are examples of this, but we would hesitate to say that a winged insect was in a larval state. Lichtenstein, however, has admitted this theory and has gone further. He compares the products of agamous insects to the bulbules and to the rhizomes of various plants, establishing an absolute parallel between the Aphidia and certain plants. For him the parthenogenesis of the agamous forms is nothing but a simple budding, while the fecund egg represents the grain or germination.

† The complete cycle of the insect, which ordinarily requires two years and more, can be accomplished in a year. Many experiments have proved this. M. Balbiani (page 20) gives an instance in an experimental bottle where the winged insects have appeared in the month of August from roots to which the gall insects had gone two months previously. M. Boiteau (*Comptes rendus*, November 6, 1876) says that gall insects placed in an experimental tube fixed themselves on the roots, and from their descendants winged insects came in the beginning of September. Other observers, as Schimer and Knyasef, having found the winged insect in the galls, have come to the conclusion that the complete cycle of the phylloxera can be effected entirely above ground; otherwise said, that the root form of the insect can be skipped in the cycle. This theory lacks proper proof. M. Champin, in Drome, has observed winged insects in the galls. We have ourselves seen the nymphs go upon the stumps to metamorphose into the winged insect, and it can easily be supposed that some might accidentally reach the galls and be transformed there. We can say, therefore, with M. Balbiani, that the transformation of the gall into the winged insects is yet to be proved.

‡ See on the Evolution of the Egg, Cornu, page 195.

As we have already noted with the winter egg, it is easy, shortly before the hatching, to see the two eyes as well as the line which M. Cornu has called the "dentalated crest," and which is destined to split the different coverings of the egg. This crest also separates the membrane immediately enveloping the embryon. "If, after hatching," says M. Cornu, "one secures this membrane, he can note that it is brown and is split by the anterior part and exactly according to the direction of the crest."

The galls and gall insects which we have described are best observed on certain wild American vines, such as the Riparia, Clinton, Solonis, and Taylor; that is to say, on the different varieties of the *Vitis riparia*. On these vines the phylloxera probably first existed, as they seem best adapted to the mode of life of the insect. On these varieties the insect appears to pass through its four forms most readily and without the vine appearing to suffer. The varieties of the *Vitis æstivalis*—Jacquez, Herbemont, Cunningham, etc.—show a far less number of galls on the leaves; their roots, frequently infested with the root insect when young, appear at the age of four or five years to throw off most of the insects. Not having defended themselves so vigorously against the insect as the Riparia, there are not produced rootlets replacing the old ones. With the *Vitis labrusca* and its derivatives, the Concord, Isabella, etc., very few galls appear, and their root resistance is comparatively feeble. Even in America these varieties in the end succumb; the vine is badly adapted to resist, and the *Vitis labrusca* is certainly not the species on which the phylloxera originally lived. Lastly, the *Vitis vinifera*, the European vine, is the most poorly equipped of all species to resist the insect. The resistance of its roots is the feeblest, and it is extremely difficult for the galls to form on the leaves.

It is the rarity with which galls have been noticed on the vines of the *vinifera* which has brought many authors to say that the gall form is skipped on them, and that the product of the winter egg descends directly to the roots of the vine. This hypothesis has never been sustained by observation. Nevertheless, the doubt exists; and in the book of M. Balbiani, which we have called the work of a master, a certain passage shows that this author was not far from admitting this theory at the time he wrote.*

We should add here that in a later work he (M. Balbiani) has clearly renounced this theory.†

M. Henneguy, delegate of the Academy of Sciences, is opposed to this theory of the habitual descent of the product of the winter egg to the roots.‡ He gives particulars of an interesting experiment made by M. Savre, professor of the agricultural department of Lot, who used lime wash in

*M. Balbiani, page 28, says: "Does the issue of the winter egg always show on the leaves, or does it descend directly to the roots after it is hatched? This cannot be said precisely; it appears that the nature of the vine is not without its influence in deciding this." M. Dr. Fatio (*Le Phylloxera dans le Canton de Geneve en 1876*, page 20) says for his part: "The largest laying insects on the roots. which I call here *Nodicole*, appear to be very probably the direct product of the winter egg; that either the egg hibernated on the roots, or that after the hatching on the wood above ground, the young gall insects enter, prematurely, the soil without forming the gall." Further on M. Fatio is still more affirmative: "The issue of the winter egg, at Geneva, proceed in great majority promptly to the soil in spring."

† Balbiani: *Rapport au Ministre sur le traitment contre l'œuf d'hiver en 1884.* (*Compte rendu des Travaux du service du Phylloxera*, 1885, page 158.)

‡ Henneguy: *Rapport sur la destruction de l'œuf d'hiver.* (*Compte rendu des Travaux du service du Phylloxera*, 1887.)

a treatment against the winter egg, and the experience is worth citing. "The French vines," says M. Henneguy, "such as Malbec, Cot-rouge, etc., were treated with lime wash in the months of February and March, 1886; but the mixture was not applied to any of the wood two years old. The vines presented a goodly number of galls later. This result was wholly natural, since the wood of two years is the preferred location of the winter egg; but the interesting portion of M. Savre's observations is in the fact that the galls came on the leaves of the European vine, where ordinarily their appearance is exceptional. M. Savre thinks that the insects coming from the winter egg were stopped in their descent to the root by the toxic vapors, and went to the leaves and formed the galls. For the same reason the young phylloxera of the second generation remained on the leaves, and the galls multiplied. According to M. Savre the issue of the winter egg goes directly to the roots to form colonies there, but when stopped in this manner the colonies of gall insects appear, even on our European vines."

Many investigators—among them the writer—have sought in vain for the phylloxera coming directly from the winter egg, in the first generation, upon the roots of the vines; having found the first generation on the leaves, we do not believe that in the natural state the insect goes directly to the root. We have for a long time exchanged ideas on this subject with M. Boiteau, as well as with others, and until new proof to the contrary is produced, the observation of M. Savre must be regarded as isolated, and we must abide by the results of the experiments and observations of M. Boiteau, which are without doubt authority.

Returning for details to the notes published in the *Comptes rendus* (April 20 and 27, May 10, June 3, July 8, August 5, and November 3, 1876), and also to the brochure entitled *l'Œuf d'hiver et son product* (Libourne, Maleville, edit. 1876), and borrowing also from letters received directly from M. Boiteau, we will resume the question. It is true that the parenchyme of the leaves of the *Vitis vinifera* is little favorable for the production of galls; true that the galls are badly developed or in forms of cups; true that there are fewer eggs; true that on the European vines, as early as the second and third generation the young begin to descend to the roots; true that the number of galls is smaller, and that the galls are ordinarily on the first, second, or third leaves from the base of the vine cane, and difficult to see.

This is not to say that on the European vines the gall form is skipped. It must not be forgotten that it was on a French variety, the Tinto, that the galls were first observed in France, by M. Planchon, and that before American vines became widely spread in their use, many observers, such as Planchon, Lichtenstein, Cornu, de Laffite, Henneguy, Lejourdan, Faucon, Boiteau, and the writer, have all seen them on French vines. During the summer of 1888 the galls were common on the collection of French vines at the School of Agriculture at Montpellier.

"Certain years," says M. Boiteau, page 21 of his brochure, "the galls are very abundant on wild vines that may be set in the rows of European vines already attacked." The gall insect appears to recognize there the most favorable conditions for its development. The writer has noticed that whenever the *Vitis riparia* is planted in the vicinity of the *Vitis vinifera*, the winged insects alight preferably on the *riparia*, their

preferred habitat. Knowing this, and knowing the favored spots of laying the winter egg, it might be best to destroy as many winter eggs as possible each year by the use of the lime wash of Balbiani.

The gall insect then exists on European vines when a winter egg has been laid; it is only in that the generations are fewer, less prolific, and that the galls are better hidden that the gall form differs from the gall form on the American vines, and that it is more difficult to prove its presence. * * *

CHAPTER VII.

ROOT INSECT.

The root form of the phylloxera is the agamous form, which follows the gall insect, which lives on the roots of the vine, whether coming from the leaves or from preceding generations of the root form which originally came from the gall insect. This form is the most widely and best known, the first one discovered in France, the only one which kills the vine, and it is for the last named reason that it has been called the devastating form. As well as being the best known, and being the most numerous in individuals, it is also the most extraordinary from the fact of its subterranean life. * * *

Fig. 9.
Swelling produced by the attack of phylloxera. *a*, on young roots. *b*, on older roots.

The presence of the root form in a vineyard is manifested in spots when the vines are sickly. The beginning of these spots is very small, but they enlarge little by little, and usually in three or four years—sometimes in two years—there are dead vines in the center of the spots. Around the dead vines there are others that have few tendrils, and small and frequently yellow leaves, and as the distance from the center of infection increases, the vines gradually take on a more healthy appearance, until no signs of disease are visible.

It must not be thought, however, that whenever sickly vines, or spots, appear in a vineyard, that phylloxera is necessarily present. Without speaking of the *pourridié*, a cryptogamic malady which often produces such effects, the same phenomenon can be produced by the attacks of other insects. Only by the examination of the root itself can the exact cause of the malady be determined.

Nodosites.—Under the influence of the attack of the insect, nodosites are formed. These are excrescences of parenchyme, of a bright yellow color, and of many different forms. Sometimes they take the form of a vesicular swelling, occupying part or a whole of the rootlet (see Fig. 9, *b*); sometimes, and more frequently, they take up the extremity of the rootlet.

They are generally bent like a bird's head and bill; the insect is located at the deepest point of the bending. (See Fig. 9, *a.*)

Is this hypertrophy of the tissue due to a venomous liquid injected by the insect? This is not the opinion of M. Cornu, who says, with reason, that the different phylloxeras of the oak, which attack the leaves only, produce brown spots, due to the partial desiccation of the leaves. The action produced by the root form on the young rootlet appears to be due to mechanical causes, the same as the action of the gall insect on the leaf, only the organ of injury is different. Not having the same constitution, the hypertrophy is effected in a different manner. The insect drains the cellules under it; but on the root a great depression is never produced as with a gall. By this depression two things result: The change of the organism, and its hypertrophy. The first is caused by the arrest of development on one side and its continuation on the other; the second proceeds with the multiplication of cellules in a mass, on the other side. With the leaves the mode of growth is different than with the roots. The development proceeds freely on a thin and flat surface, and the gall grows without sensibly deforming the leaf. * * *

Concerning the composition of the tissue of the nodosities, we can note many grains of starch in it, easily observed by means of the ordinary iodine test. It has been said by certain partisans that the presence of the starch was the cause of the disease. "This deposit of starch," says M. Delamotte, "is truly due to the absence of vitality of the cellules," etc.*

Very frequently on plants said to be resistant, the nodosities decompose with strong heat, and the death of the rootlet follows, but the rapid replacement of the rootlets permits the vine to live. With the European vines this does not hold good. The rootlets succumb, while with resistant vines the hypertrophy of the tissues and their decomposition is limited, the cicatrization of the wound sets in, and the evil is repaired. In that portion of the work in which the defense against phylloxera is treated, the writer will enlarge upon the causes of the resistance of American vines.

Description of the Root Form.—This form (see Figs. 10, 11, and 12) is closely related to the last generations of the gall form. Certain individuals are difficult to assign to one form or to the other. * * * Without referring to the many experiments which have placed the gall insects on the roots, the inquiry arises at what point the naturalist is able to distinguish between the two forms.

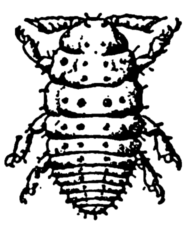

Fig. 10.
Young Root Phylloxera.

Having sufficiently described the gall form, we will describe the root form comparatively. It is about a millimeter in length in place of a millimeter and a quarter; it has brown salient tubercles on the back; the antennæ are provided with jagged edges; and the number of eggs laid is never over one hundred. As with the gall form, it undergoes three moultings. The tubercles, disposed in longitudinal and transverse lines, number seventy, of which twelve are on the head, twelve on the pro-thorax, eight on the meso-thorax, eight on the meta-thorax, six on the first abdominal ring, and four on the next six rings of the body. The last abdominal ring does not have any. These markings on the skin form,

* DELAMOTTE: *Monographie du Phylloxera vastatrix*, Alger, Adolphe Jourdan, 1885.

at first, an important difference between the two forms; but after the first moulting, this characteristic nearly disappears. After two or three days they are again visible. * * *

From a morphological and physiological standpoint, what is the nature of the function of the tubercles? No author writing of the phylloxera has spoken of them, save M. Cornu, who has nevertheless described these organs. (Page 205, *et seq.*) M. Balbiani, in writing of the *Phylloxera quercus*, says incidentally that in this species the tubercles have a glandular appearance when placed under the microscope.*

The question, for the writer's part, can be solved by placing certain related insects under the microscope, and with them these tubercles are for secreting a wax; with the *Phylloxera vastatrix* the same is undoubtedly true, except that the glands have atrophied and the wax is not secreted. There are no tubercles on the winged insect; they are reduced to mere hairs in the sexual insect; slightly apparent in the gall insect; and reappear, though without functions, in the root form and the nymph. They form, in the root insect, cushions to prevent rubbing the skin against the earth. No reason existing for their continuance on the aërial forms of the insect, they disappear.

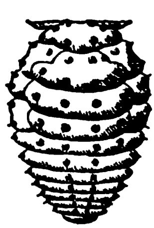

Fig. 11.
Root Phylloxera—Back view.

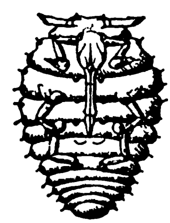

Fig. 12.
Root Phylloxera—View of the front.

Who can say that with certain phylloxera, such as the *Phylloxera quercus*, some of the waxy secretion may not be found?

As with the gall form, the root form undergoes three moultings. They are well described by M. Cornu, page 211. * * *

As we have said, the root form never lays over a hundred eggs. With the gall insect, the last generations, in autumn, may not exceed this number; but with the root form a hundred seems to be the maximum. The progressive degeneration of the production of the ovary appears to find here its confirmation. Starting with the gall insect coming from the winter egg, as many as fifty ovigenous tubes can be found in the ovary. In the spring which follows the descent of the insect to the roots—that is to say, at the greatest generative period of activity—the ovary of the root insect has from twelve to twenty such tubes, and in the autumn no more than six can be counted, or four, and even two. (Balbiani, *Comptes rendus*, January 15, 1883.) In the autumn of 1880, the writer found, at Montpellier, a root insect having but a single ovige-

* Without taking the reader into the confusion of the two species of the phylloxera of the oak, which have been confounded by many authorities, among them M. Balbiani, we will designate by the name *Phylloxera quercus* the species which he studied so well in comparison with the *Phylloxera vastatrix*. This is not, however, the veritable *Phylloxera quercus*, but is a species common in Northern Europe and known to science as *Phylloxera coccinea*, Heiden. The true *Phylloxera quercus*, that of Boyer de Fonscolombe, is a species common in the central portion of Europe, and very different from that of the north. See on this subject the notes exchanged in 1874 between M. Balbiani and Dr. Signoret; in that of December 7th, Dr. Signoret elucidates well this question.

nous tube, with a single egg in it. The insect becomes, with time, relatively small, and we are led to believe that in the last generations the root form becomes nearly sterile.

However, in the springtime generations relatively prolific succeed those of the autumn in which the reproductive power is small. But this renewal of regenerative power is explained as follows by M. Balbiani: "With the return of vegetation and heat, the number of ovarian tubes does not rise with the descendants of the last laying insects of the autumn. The activity of the laying increases under such influences, and suffices to produce, during a long time, a numerous population of insects." M. Balbiani developed this theory long ago in his response to a note of M. Targioni-Tozetti (*Comptes rendus*, January 15, 1883). This fecundity, according to him, can be continued for three years without intervention of the sexual insects; and even during four years, according to a note of M. Mares (*Comptes rendus*, September 12, 1877). * * * Kyber succeeded in maintaining under glass for four years the agamous generations of an insect attacking the pink. In his *Monographie des Aphidiens*, page 153, J. Lichtenstein goes much further. "If we are witnesses," says he, "to agamous reproduction during four or five years, why can it not be continued longer? Why will it not continue indefinitely? Reaumur has already asked the question." Here we really leave solid ground and hard facts.

We will refer, as quickly as possible, to the contents of the note of M. Boiteau (*Comptes rendus*, July 18, 1887). We see that the generations, experimentally, had been pushed up to the 25th, and to the month of July of the sixth year. At this epoch in the life-history of the generations there were plenty of insects, and they were still very prolific. To what point can such experiments be pushed? This we await with ordinary interest, for it seems to us difficult in the state of nature to avoid absolutely one of the factors which breaks up such reproduction—that is, the appearance of sexual insects.

We must believe that in the natural state the agamous colonies, if not regenerated by the sexual insects, would gradually be extinguished. They are diminished, besides, in great measure by the considerable number of young root insects which become nymphs, and leave the soil, to be transformed into winged insects. Sometimes the entire colony appears to undergo this transformation in the second year; this has been noted by M. Marion and many other observers. Perhaps this is the normal end of any particular colony of root insects. This presumption, according to M. Balbiani, is proved with the *Phylloxera coccinea*, in which manner entire colonies are dispersed.

Can the root forms go to the leaves and produce galls? Many naturalists have asked this; and M. Marion has asked if the galls which appear sometimes in summer at the extremity of the canes which carried none in spring, do not originate in the soil and proceed thence to the leaves. At present no experiments have been made on this subject, except in the laboratory. In 1870, M. Riley succeeded in transforming the root form into the gall form in an experimental way. M. Marion has obtained the same easily. M. Balbiani (*Comptes rendus*, November 2, 1874) also succeeded in fixing the root form on the leaves in experimental tubes; but the insects placed their sucking apparatus on the lower side of the leaves and no galls were produced. * * * Such experiments, for the writer, do not weaken the regular order of

nature, which is that even if the young root insect leaves the roots, it does so to emigrate, and always goes back to the ground. As for the argument that galls appear in summer when there were none in spring, the same has been seen by the writer, and it is doubtless due to the fact that the gall insect has been carried by the wind or other outside influence to the vine on which no galls appeared in the spring. The wind is a powerful and active agent of dissemination. We will have occasion to return to this subject when we return to the migration of the insect under its different forms.

CHAPTER VIII.

THE HIBERNANTS.

It remains for us to say some words about the hibernants. These are the insects which pass the winter on the large roots of the vine, and which take refuge in cracks of the bark or under the exfoliated corky tissue of the bark. They are sheltered from too great wet, and from immediate contact with the soil. They can be discovered by lifting up the rather loose exterior covering of the bark, and can be seen in groups or isolated. Their color is brown; they are flat and their form is attenuated behind. These legions of parasites are young gall insects which have descended from the leaves and, especially, root insects born late in autumn.

They pass the winter without moving, their sucking apparatus implanted in the bark, and their antennæ folded across the body; they are waiting for fine days to arrive before going to the rootlets and growing. They are generally very small, some having not passed the first moulting, and some not having reached the second; but here and there are found some older insects, which had commenced to lay eggs before the cold came, and which continue slowly to accomplish it. Nearly all the eggs thus laid die; but if the temperature is not lower than 10° Centigrade they hatch, and the young go to increase the number of hibernants. This temperature of 10° Centigrade appears to be the minimum under which the insects become numb, and above which they go out of their torpor. That cold will not kill the hibernants, the winter of 1879–80 proves. In the district about Orleans, in December, 1879, the thermometer descended to — 25° and — 30° Centigrade, and many of the vines were frozen, but the insects did not disappear. M. Maurice Girard proved, experimentally, by means of freezing mixtures, that the phylloxera would sustain a temperature of — 8° and — 10° Centigrade without dying. Dr. Horvath, of Buda-Pesth, has carried these experiments further (see Acad. des Sc. de Hongrie Seance, April 23, 1883). In the experimental grounds at Farkasd he exposed phylloxerated roots in open air for a period of eighteen hours to a temperature varying from — 1° to — 12° Centigrade, and the insect was found to be still living. Now, at the station at Montpellier, in the coldest weather noted, the temperature at the level of the soil was — 12° to — 13° Centigrade, while at 25 centimeters in depth the temperature was never lower than — 1° to — 2°. In Herault the hibernants begin to move about the middle of April. At this time of the year sufficient rootlets have developed so that the insect can descend and resume its ravages.

CHAPTER IX.

WINGED INSECT.

About the middle of June, the observer can begin to perceive on the young roots, principally at the nodosities, individual insects longer than the others, with legs and antennæ relatively long, supplied with very noticeable tubercles on the back, yellowish-orange in color, and with the ovary little developed and containing no eggs. (See Fig. 13.)

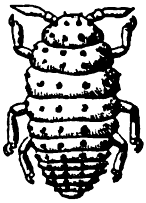

Fig. 13.
Phylloxera destined to be transformed into a nymph.

These special individuals are the larvæ, from which come the nymphs, and from which in turn come the winged insects. They undergo three moultings before being transformed, and the winged insect will be submitted to five before its flight. If one of the larvæ is examined before the fourth moulting and before it has become a nymph, swellings will be noted on the sides from which will eventually develop the wings. The metamorphosis takes place in the soil and usually begins about the 20th of June.

The nymph (Fig. 14) is remarkable for the length of its body, the legs and antennæ, which recall those of the winged insect, and especially for the stumps lying laterally on the sides, on the meso- and meta-thorax. These rudimentary wings are black in color, while the color of the body of the insect is yellowish-gold or orange. The length of the body varies from less than a millimeter to more than a millimeter and a quarter, with the breadth in proportion. As with the root insect, there are seventy tubercles on the dorsal side, and their disposition is the same. The antennæ, lengthened over those of the other agamous forms, have developed a third article, but still has one olfactive stigmate. The eyes, numbering three, are of reddish color, are placed in triangular shape behind the antennæ, are larger, more globular, and closer one to the other. When the insect approaches its last transformation the raspberry-shaped eye of the winged insect is plainly visible through the transparent skin.

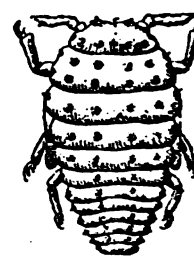

Fig. 14.
Nymph of the Phylloxera.

At the same time the eggs can be seen forming in the tubes in the ovary; but the nymph never lays an egg, as has been wrongly thought by M. Gerstäcker, of Berlin. The phylloxera while in this form nourishes itself, its feeding apparatus being planted firmly in the nodosities. Its duration in this form is usually six to eight hours, but this can be prolonged if the time is not propitious for the last metamorphosis.

Usually in the morning the nymphs leave the roots in order to be transformed into winged insects on the stump of the vine or the first object reached, or from a fissure in the soil. Some, however, go forth in the evening. This is a time of great movement for them, and their relative activity is great. They go up by the roots to the stump, or else reach the open air by means of a fissure in the soil, and it can be readily understood that soil which cracks and fissures is much more favorable to their flight than sandy soil. In experimental flasks they often start their flight from the glass, affording as it does a solid footing.

A nymph which has left the soil at 6 or 7 o'clock in the morning will complete its metamorphosis toward 9 or 10 o'clock. It is then of a darker color, owing to the loss of the skin, which has been detached. The last moulting can easily be observed, owing to the regularity of the hour, and is very interesting; but we will not enter deeply into the details. The constant movement of the nymph, and the relative dryness of the air, as compared with the soil, facilitates the breaking of the skin and the flight of the insect. The wings are, for the nymph in transformation, a great complication. If it should rain the insect will be held to its place, and will die in one or two days. Even in experimental bottles care must be taken at this period that the flight is not hindered by reason of drops of water on the sides of the glass.

Immediately after the transformation the winged insect is yellowish-gold in color, very pale on the thorax; the wings are white, and the head turned up to enable the insect better to spread the wings by their own weight. By watching the insect at this moment, through a microscope, the air can be seen to enter little by little the trachea, which appears then to be black lines. There are darker bands, which are the nerves. * * * After a delay of about two hours, that is to say, toward mid-day, the teguments of the insect have become sufficiently strong to satisfy the insect to follow its instincts of emigration; but before describing its flight we will give the following description of the insect:

The body (Fig. 15), is quite elongated. It is entirely deprived of the the tubercles noted in the root form, and in color is reddish-yellow and orange, except the meso-thorax, which is black. The wings are very long, lie flat on the dorsal side of the body, are clear and transparent and somewhat iridescent. Their microscopic particles or granulations are directed backward, and are imbricated one upon another. The wings are longer than the body by about a millimeter. * * *


Fig. 15.
Winged Phylloxera.

The head is remarkable for its eyes and antennæ. The last article of the antennæ is very long, and instead of having one olfactory stigmate it has two, one at the base and the other in the ordinary position in the other forms. The eyes, which have a reddish color, are multiple and of four sorts: First, the two ordinary groups of three ocelles; second, two large eyes, raspberry-shaped, and formed by the union of many crystalline hemispheres placed laterally above the three primitive eyes; third, a pair of ocelles situated in front between the two large eyes; fourth, an isolated ocelle on the top of the head and between the two antennæ. As this winged insect is designed to go abroad and found new colonies, there is need that its organs of sense be better developed than is the case with the three other forms. The sucking apparatus is shorter than with the agamous, apterous forms. The thorax is a trifle longer than it is broad and is made up of segments, that in the middle (meso-thorax) being black, and the wings are fixed on the dorsal side of the last two segments. The six legs are strongly attached, are long, springy, and are of a deeper yellow color than the body. The abdomen is made up of eight segments, the last ones being

thinner than those in front, and the shape of the whole is something like that of a spinning top, owing to a compression of the first segment. The ovary is easy to see with a microscope. There are generally but two ovigenous tubes, but this may vary. The writer has seen instances of but one. Each tube contains two ovules, and but one usually matures. Instances have been known where the winged insect laid eight eggs, but the usual number is two.

Between mid-day and 2 o'clock, if the weather is fine, the winged insect takes flight. In spite of the length of the wings the flight is heavy, and it is only after drawing up its wings to a plane perpendicular with its body, that the insect can launch itself. If the air is calm the insect will fly some tens or hundreds of meters or more; but if the wind is blowing it can be carried many kilometers, and it is to this cause that colonies distant from a place of infection are established normally. Reaching a young and vigorous vine—always chosen in preference to an old or diseased one—the insect alights at the extremity of a cane and quickly goes under a leaf. There it plants its beak, and for about twenty-four hours it feeds. It is then capable of laying; and it is the necessity of satisfying both instincts of emigration and feeding, that makes the problem of securing eggs of the winged insects in an experimental tube so very difficult. Ordinarily in experiments, it dies without having laid, or its eggs are sterile. * * *

The eggs which are laid are of two sorts: larger ones, from which come females, and smaller ones, from which proceed the males. The larger ones are about 0.40 of a millimeter long and 0.20 broad; the smaller ones are 0.26 of a millimeter long by 0.13 broad. The color of the eggs is yellowish-white, and they are more translucent than those of the other agamous forms. M. Balbiani says he has seen both sorts of eggs laid by the same insect. This, however, is rare. Generally the eggs which produce the males are laid by the smaller insects. These two types constitute the colonization form of the insect. They were noticed in 1871 by M. Planchon, who gave them the names of *Androphore* and *Gynephore*. * * *

In the natural state the eggs are laid in groups of two to four, between the veins of the leaves or under the bark of the vine. The number of males produced is two out of ten, according to M. Balbiani. In 1887 the writer obtained a greater proportion—three in ten.

Ordinarily the winged insects are abundant wherever the vines are young. In certain years, however, few can be discovered. They begin to appear about the end of June, and in July they are numerous. August and September are the months when the greatest number is produced. Toward the middle of October there are generally no more. However, in 1888, when the summer and autumn were relatively warm in Languedoc, the writer found many in October, and found nymphs as late as November, from which winged insects were obtained. Lichtenstein made the same observations in 1880, and having taken vines to the hothouses of the Botanical Garden of Montpellier, obtained winged insects even until March, 1881. It is only cold weather which ends their appearance in the central portion of France. It is permissible to suppose that in warmer countries, like Panama, for instance, of which we have already spoken in the chapter on the history of the insect, that the egg produced by the sexual insect is no longer a "winter egg." * * *

CHAPTER X.

SEXUAL INSECT.

The two sorts of eggs laid by the winged insect produce the sexual insects. As we have said, two or three small eggs are laid by the winged insects for every seven or eight large eggs. The males produced are in the same relation to the number of females, so that each male can fecundate several females.

The sexual insects are very small, are difficult to find in their natural state, and it can be said that this form, called the regenerator of the race, has been seen on the vines by comparatively few naturalists. In order to see this form at will, the winged insects must lay their eggs in experimental tubes, under the difficult conditions already described, and the hatching, which usually requires about eight days, must be closely watched.

Aside from M. Cornu and M. Balbiani, no one has studied in detail the sexual insect; we must then borrow from their work. The sexual insects of the phylloxera of the vine were first seen by Cornu (*Comptes rendus*, November 3, 1873), and alongside this came the discovery of the sexual insects of the phylloxera of the oak, observed by M. Balbiani (*Comptes rendus*, October 20, 1873). On this subject M. Cornu does full justice to his collaborator, M. Balbiani (page 266), saying: "M. Balbiani observed that the winged insect of the phylloxera of the oak laid eggs of different size and color—some reddish and small, the others yellow and larger; that these eggs soon hatched apterous insects, unsupplied with eating or digestive apparatus; that the small eggs produced males and the others females. After coupling, the female laid a single egg and died. This egg, after being laid did not hatch shortly afterwards, as was the case with the eggs laid by other forms, but a winter passed before the hatching. The egg did not hatch until spring, when the oak produced its first leaves." This egg which goes through the winter without hatching, and which is destined to produce new colonies of insects, was named by M. Balbiani the "winter egg." The hatching of this egg was first announced in the *Comptes rendus*, April 13, 1874. The discovery of the sexual insect without any feeding apparatus was published first on October 20, 1873. Immediately after reading these notes at the time (the fall of 1873), I sought to find the individuals coming after the winged insect, and though the month (October) was very unfavorable, I was fortunate in finding an individual without digestive apparatus. This individual, as well as another which followed, were submitted to M. Balbiani, who recognized them as two females, each with an egg in its abdomen.

We will not insist on this discovery of the sexual females, confirmed two years later by M. Balbiani (*Comptes rendus*, October 4, 1875), as it repeats what was said in the historical sketch of the insect. There remains to be described the sexual insect and its egg. Returning again to the original source of information, the writer cannot do better than quote M. Balbiani:

"The sexual insects of the phylloxera of the vine greatly resemble the sexual form of the phylloxera of the oak. They represent, with them, the lowest form of the species.* They are incapable of producing their

* We do not consider, with M. Balbiani, that the sexual form is the lowest. Sexuality is indicative of superiority, both with animals and vegetables.

kind alone, as with the other forms, and isolated are absolutely sterile. Thus they are at the lowest end of the scale; they are designed only to procreate. They do not eat during the few days of their life, having no feeding or digestive organs, and they are sustained only by the substance taken in from the egg in which they are hatched or carried in their bodies.

The male (Fig. 16) is from 0.26 to 0.28 of a millimeter long and 0.12 to 0.14 broad; the female (Fig. 17) is 0.45 to 0.50 of a millimeter long and 0.20 to 0.22 of a millimeter broad, and is thus nearly twice as large as the male.

Fig. 16.
Sexual Male.

Fig. 17.
Sexual Female.

The two sexes differ further: First, in color, which is a bright yellow in the male and a pale yellow in the female; second, in the *poils des quatre*, short, stiff, and cylindrical in the male, delicate and finely filiated in the female; third, in the form of the antennæ, the terminal article being thinner at the base with the female. This last article has but one olfactory stigmate.

We will complete this description by giving some details of the interior anatomy. The greatest difference between the two forms at first sight is that the female carries a large egg occupying the greater portion of the interior of the body. (See Fig. 17.) The insect when about to lay is little more than an egg mounted on six legs and supplied with antennæ. The ovary is represented by a single sheath, composed of a germinative chamber, which contains the egg and the oviduct. The copulatory sac, according to M. Balbiani, remains always empty, on account of the narrowness of the fecundating canal, and the spermatozoa are deposited in the oviduct. There are also two sebific glands intended to coat the egg at the time of laying; the oviduct is provided with muscular fibers striated transversely and intended to facilitate the expulsion of the egg. In the male, with the assistance of the microscope and a strong light, the body is sufficiently transparent to enable the observer to see the two testicles and two accessory glands. The last segment of the abdomen forms, in its prolongation, a bi-valvular sheath, through which passes the ejaculatory canal and which has the same function as a penis.

Almost immediately after being hatched, which takes place when the winged insects have laid their eggs, whether on the leaves or under the bark, the sexual insects copulate. We have seen that the male can fecundate several females, but as each female has but one egg in its ovary, this must not be considered as extraordinary reproductive power. However, all the females hatched do not copulate. These are the ones that are produced too far from the vicinity of a male, and they either do not lay at all and die, or drop to the ground a sterile egg, which soon dries up.

"At the time of copulation," says M. Balbiani, "the egg is only about

half the size (0.12 to 0.15 of a millimeter in length) that it will subsequently reach (0.27 to 0.30 of a millimeter)." * * *

After fecundation the females leave the leaves or bark where they were hatched and go instinctively to the wood two years or older, the bark being sufficiently adherent to assure the safety of the egg until spring. Once there they place the extremity of the abdomen between two fibers of the bark, and there they laboriously lay the egg—the winter egg—after which, drawn by violent contractions, they soon die. In searching for the winter egg, look for the body of the female, and the egg will not be far from it.

We began the description of the phylloxera of the vine with the winter egg, and we terminate the description here, with its having been laid.

CHAPTER XI.

MODE OF THE SPREAD OF THE INSECT.

By the Winged Insect.—As we have seen, the winged insect is especially designed to form new colonies. That is its special mission. * * The insect does not take its flight when the weather is cold and wet. When the weather is fine and calm, it does not fly farther than some hundreds of meters; but when the wind blows, the insect will be transported—in spite of its naturally heavy flight—some thousands of meters, and with a strong wind, some tens of kilometers. Thus it is that infected spots will break out 40 or 50 kilometers from vineyards already infected. The spread is thus most rapid in the direction of prevailing winds. Very frequently, too, man will unconsciously transport the pest. The delicate insect will alight on his garments, and so make its way, or on wagons or trains. In 1877, after a warm journey from Montpellier to Beziers, the writer noticed, while not far from the latter place, a winged insect alight on an open book held in the hand. At this time the vineyards near Beziers had not been attacked, and the incident was deemed worthy of a public notice.* How many other people have thus unconsciously carried the insect into vineyards yet unattacked!

Diffusion of Apterous Forms.—The apterous forms can also spread from infected spots without the winged insects coming in. Step by step the spreading is accomplished from these spots by the root form, which is always hungry and always agile in moving. When the weather is warm this form will leave the roots by fissures in the soil and go to the roots of neighboring vines. This movement is very considerable, and was first seen and described by M. Faucon, and has since been observed by numerous naturalists.† Even in the case of phylloxera in captivity, one can easily see, from 1 to 5 o'clock, the edge of the bottles covered with a mass of these young emigrants. According to M. Faucon, from 2 to 3 o'clock on the days in the second fortnight of August the greatest of these emigrations take place. The young insects go from enfeebled vines to those more vigorous, and, as it easy to understand, clayey soil, especially where cracked by dryness, is most favorable to such emigrations. In sandy soil, which has no fissures, the sand slips

* *Messager Agricole du Midi*, September, 1877, page 312.
† FAUCON: *Modes de Propagation du Phylloxera*, 1874, page 42.

under the insect, the emigrations are all but impossible, and even if a colony of insects is started in such soil, it is not difficult to exterminate it.

The young root phylloxera does not pass from one vine to another underground, unless the roots cross, which is rare. Its feet are unprotected and are poorly fitted to dig through the soil, the integument covering them being very soft and easily broken by the least pressure; further, instinct teaches them to emigrate on the surface of the soil.

Such are the modes of dispersion near and far.

* * * * * * * *

The accidental diffusion by man, and his means of transportation, have been alluded to. That of the apterous forms, occasioned by commercial relations, is naturally most frequent, and no one has any doubt that the pest originated in the Old World from the root insect brought from America with rooted vines. Some persons believe that only rooted vines are dangerous sources of spreading the insect, but this is an error. Not only can it be carried on cuttings of two-year wood, but the writer has proved the presence of the young apterous insects on wood a year old.

When the autumn is sufficiently warm to permit vines in protected spots to have leaves and vegetate until the first days of December (which is frequently the case with American vines in Languedoc), the generations of phylloxera continue not only on the roots, but on the leaves; and when the leaves fall the young gall insects can be seen on the canes. * * *

In the journal *La Vigne Americaine*, December, 1882, the writer cited a certain and authentic instance where the phylloxera was carried from France to Hungary.* In the point in question a lot of American vine cuttings were sent from the station at Arles to M. Horvath, the well-known naturalist at Buda-Pesth. The package, sent from Marseilles to Fiume, was by an accident sent back to Marseilles, and after some other adventures forwarded by rail to Austro-Hungary, arriving at the destination in June, after an eventful travel of more than three months. "On opening the cases," says M. Horvath in his official report to the Hungarian Government, "the canes had begun to vegetate, rootlets were present, and on these were numerous swellings covered by phylloxera."

A very good precaution is to disinfect the cuttings. In the note to *La Vigne Americaine*, the writer advised that they be treated to fumes of sulphurous acid (sulphur fumes), but the success of the experiments of disinfecting with hot water, undertaken by M. Balbiani, followed by the success of the similar experiments by Henneguy and Couanon and Salomon, makes the writer prefer this method, at once simple and efficacious.

M. Balbiani has proved that immersion of the cuttings for one minute in water heated to 50° Centigrade will destroy not only all the phylloxera, but all the eggs.† Below 45° C., during an immersion of five minutes, the number of eggs that survived increased until 42° C., when all survive. This point of 45° is, according to the latest scientific experiments, the point at which the tissue can be completely changed. * * Viticulturists thus have at hand a practical disinfectant. All that is needed is a "thermometer, water, and a little fire."

*V. Mayet: *Diffusion des Phylloxeras par les Boutures Americaines.* (*Journal la Vigne Americaine*, December, 1882.)

† *Recherche sur la Vitalité des Œufs des Phylloxeras.* (*Comptes rendus*, 1876, page 1160.)

CHAPTER XII.

NATURAL ENEMIES.

Nearly all insects which live on vegetable life have enemies, the mission of which is to restrain too great multiplication and maintain what is called the "equilibrium of species." The phylloxera is no exception to the rule, but is far better protected than many others which live entirely in the open air and are exposed to all attacks. Situated at the bottom of its retreat, the entrance to which is closed by hairs permitting exit and defending entrance, the gall insect is safe from outside attack, and the root insect, from its subterranean life, is not the less protected. It is only the young insects on the canes, leaves, and the surface of the soil that suffer. Without doubt many succumb to the attacks of the *Halysia 12-guttata* and the *Hemerobius perla;* others—even those that have not left the roots—to the *Trombidium*, *Gamasus*, *Tyroglyphus*, and *Hoplophora*. The little myriapod (*Polyxenus lagurus* of Geer) also destroys some. But supposing that hundreds are destroyed by all its enemies. What is this to an insect of which a single female will lay six hundred eggs?

In Europe, a savant beyond the Rhine, our friend Dr. Blankenhorn, of Carlsruhe, has, we believe, accorded these natural enemies of the pest a position of importance, to which they are not entitled. We might also say the same of Dr. Haller of Berne.† * * *

PART II.

CHAPTER XIII.

THE STRUGGLE AGAINST PHYLLOXERA.

We cannot enter into the details of all that has been done in order to resist the phylloxera. What has been done and reduced to scientific treatments would fill a volume. The questions of submersion and the use of American vines, have latterly assumed such great importance that they alone are special studies. We must only touch upon generalities and refer the reader to special works, such as the excellent *Traité de Viticulture* of M. Foëx (Foëx: *Cours Complet de Viticulture;* Montpellier, Coulet; Paris, Delahaye et Lecrosnier, 1888)—a work in which the phylloxera is studied entirely with the view of providing the means of coping with it.

Before attacking any enemy, its position must be studied. We have spoken already of the means of identifying this pest. The preventive treatments are not within the reach of all persons, and this side of the question has an importance which can escape no one.

† Dr. Haller: *Die Kleiner Feinde der Phylloxera*, Heidelberg, 1878.

If there are dead and dying vines in the neighborhood of the vineyards already known to be infected, there is little reason to doubt the cause. It needs but to examine the roots of vines at the edge of the infected spots and which are still vigorous. But in a section where the pest has not yet appeared and no dying spots are yet visible, it is not always easy to discover the phylloxera when it has entered such a vineyard. And as we have said, the *pourridié* (see Foëx, page 502; also P. Viala: *Les Maladies de la Vigne;* Montpellier, Coulet; Paris, Delahaye et Lecrosnier, 1887), a cryptogamic malady of the roots, and the attacks of other insects, may produce similar appearance of the vines.

In order to decide quickly if the phylloxera has a footing in a suspected place, the investigator should examine the rootlets of still vigorous vines, on the edge of a supposedly affected spot. If the vines are not vigorous and the insect has nothing on which to live, it will quickly leave for more vigorous roots, and there is no chance of finding it on dead or dying roots. The investigation is best made between June 15th and July 31st. At that time the vines are in full leaf and growth, the rootlets are forming, and if the insect is there the rootlets are thrown out constantly and bear the nodosities so characteristic. On these swellings, which are often turned up with the first stroke of the mattock, are the yellow or brown insects; the brown ones are surrounded by eggs that resemble sulphur dust. The examination can even be made by using a pocket-knife.

In all other seasons, whether in spring, when the nodosities are not yet produced, or late in autumn, when no more are formed, or in winter, when the hibernant easily conceals itself, the discovery of the insect is more difficult. It is therefore best to make the examination in summer. Once the presence of the pest is certain, action must be taken without delay.

Remedies of all sorts, even to absurdity, have been proposed. The number proposed to different phylloxera commissions and agricultural societies is more than five thousand, and those which have been scientifically and conscientiously tested at the experimental stations at Las Sorres, and at the School of Agriculture at Montpellier, number many hundreds.*

All of the resources of chemistry have been drawn upon, but few of the long list of preparations have stood the test. As might be thought, insecticides have been largely proposed. The use of insecticides is a direct remedy, but the difficulty of applying them is great. The enemy slips away easily, it is subterranean, hidden often by two meters of earth, and it becomes almost impossible to reach it.

The different methods that have practical value number very few. They can be grouped: (1) as insecticides, such as bisulphide of carbon, sulpho-carbonate of potassium, and lime washes to destroy the winter egg, and finally submersion; (2) processes permitting the vine to live

*In 1877, the Departmental Commission of Herault, presided over by M. H. Mares, had, since its creation in 1872, received word of 696 processes against the malady, nearly all of which were competing for the prize of 300,000 francs. In a period of five years, 317 had been tested at the experimental station of Las Sorres, near Montpellier, and the results collaborated by Professors Durand and Jeannenot, of the School of Agriculture, were published in a large volume. (Montpellier, Grallier, 1877.) This volume can be read with profit by those who talk of intercalary culture, of cultivating plants strongly odorous at the root of each vine, of pharmaceutical preparations introduced into the wood. As will be seen, everything has been tried—euphorbia, turpentine, garlic, and gray unguent, from lavender to vinegar, from rue to camphor, from asafœtida to sealing wax—for catching the insects.

without outside assistance, such as planting in sandy soil and the use of American vines. In writing of these we will follow this order of treatment.

CHAPTER XIV.

BISULPHIDE OF CARBON.

This liquid, known for a long time, is a powerful insecticide, volatilizes rapidly, and its vapor is heavier than the air. Otherwise said, its heavy vapor always tends to sink into the soil and not leave it.

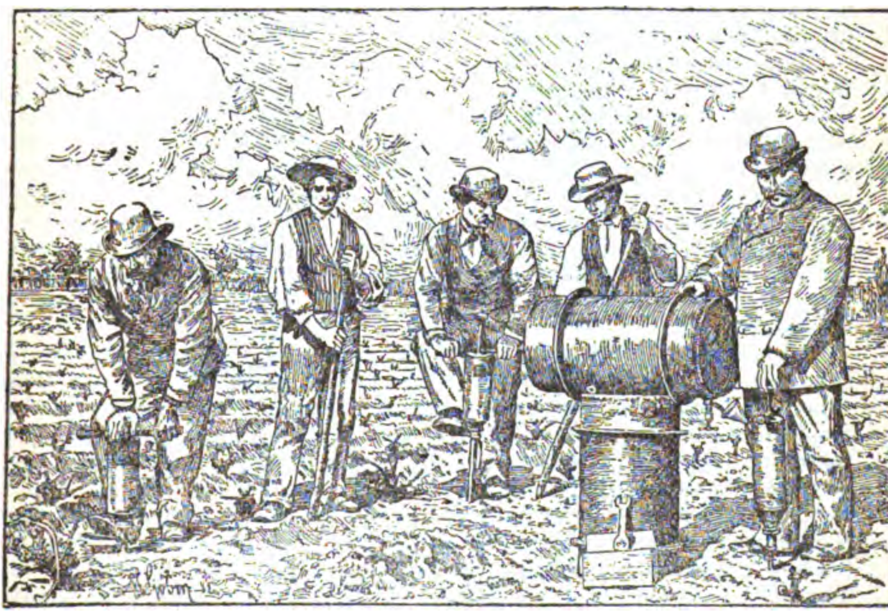

Fig. 18.

Treatment of vines with bisulphide of carbon. Taken from the work of M. Barral, entitled *La Lutte le Contre Phylloxera.*

Its employment was first suggested in 1869 by Baron Thenard, but the first experiments made near Bordeaux were not at all successful. If the dose is too strong the vine succumbs, and for some years it was not used. The idea was revived, however, at Montpellier in 1873, by M. Monestier, who, using much smaller quantities of the liquid, succeeded so well at once that the whole problem of dealing with the pest seemed to be solved. But experiments at once undertaken in different soils made it apparent that special conditions of the soil must be met in order to insure a sufficient diffusion of the vapors and the death of the greater portion of the insects.

In argillaceous and compact soils the check to this work is ordinarily complete.

The shallow, stony soils, dry, situated on hillsides, such as the

garrigues of Languedoc, are likewise rebellious to treatment by bisulphide. However, in such soils M. Thiollierè, of Isle, has obtained success on the hillsides of Hermitage, but the ground was dug up, it is true, to a depth of one meter. In light, sandy soils the toxic vapors can escape, and in case of success the query might be propounded, whether such soils did not prevent the multiplication of the insects. Soils of medium consistency are those in which the best results are to be obtained, and this is fully evidenced by the results of M. Jaussan, of Beziers, and Messrs. Allies and Marion, of Marseilles, the latter working for the account of the company, P. L. M., which are known to all.*

This medium of conditions is more difficult to appreciate. The soil must be neither too wet nor too dry; and it is easy to understand that as water is present in the soil in more or less quantity, it increases or diminishes the density of the soil.

"The treatments," says M. Foëx (page 565), "must be begun when the first traces of the work of the phylloxera are seen. If nothing is done until the effects are strongly shown—a time which corresponds with the destruction of a great portion of the root system, it may require some years for the vine to recover, by being rid of the insects and throwing out new rootlets. But if action is taken at once, at the beginning, most of the rootlets can be saved, and the vineyard will not suffer sensibly. Added to this, if the vines are badly affected by the pest, they are also very sensibly affected by the bisulphide, and the quantity of the liquid that can be used with safety will not be enough to quickly destroy the insects.

"Regarding the best season for operating, it is possible, under certain conditions, to work with equal success at any season of the year. The time of an excess of moisture must be avoided, as at such times the bisulphide will evaporate too slowly, and in the liquid state it will alter the roots. Also, it is best not to work in times when the soil is very dry, as the soil is split and cracked and the vapor will escape too freely. Neither should the time of flowering or of the vintage be chosen, because there always occurs with the treatment a partial cessation of the functions of a certain number of rootlets and a slight arrest of vegetation. The effect—stupefaction, it is called—may bring on coulure, if the treatment is early in the spring, or it may harm the maturing of the fruit, if the treatment is late."

M. Monestier operated by thrusting a stake into the ground and putting the liquid at the bottom of the hole, then closing the hole by a vigorous stroke of the heel. This was the method by which the bisulphide was first used. Since that time numerous processes have been devised; such as the bottles of Fouque buried in the ground, which permit the escape of the toxic vapor through the stopper; the cubes of Rohart, in which the sulphide is contained in porous wood by means of a special varnish, the fumes being liberated at the desired time by rupturing this coating; the aspirator and insufflator of Crolas and Jobart, an ingenious apparatus which is designed to produce a better diffusion of the insecticide, etc. To-day the apparatus most in use are stake injectors (*pals injecteurs*) and bisulphide plows (*charrues sulphureuses*), both being cheapest in price and doing the best work.

* CIE. DES CHEMINS DE FER DE P. L. M.: *Résumé des Travaux effectues pour combattre le phylloxera*, par A. F. Marion, Paul Dupont, 1878.

"The first of these instruments," says M. Foëx (page 567), "are the ordinary injectors; the plows are of more recent invention. Their employment tends to spread, as their use results in great economy. The first injectors used were simple tubes open at the lower portion. These tubes were driven into the ground and had an iron point at the end, which could be removed at will when the tube had reached the desired depth, and the desired quantity of liquid was permitted to enter the soil. Next these injectors were made having a gauging apparatus. Then the

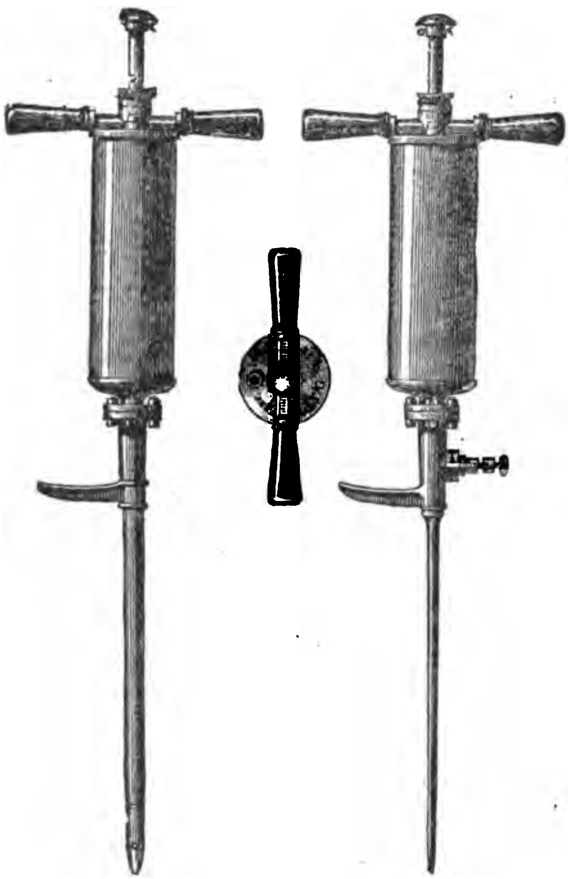

Fig. 19.
Gastine Injector.

Fig. 20.
Gastine Injector, with stem sword-shaped.

Gastine injectors came in, which are described by M. Gastine as follows:*

"As can be seen from Figures 19 and 20, the injector is a portable apparatus, composed of a cylindrical reservoir terminated by a perforating tube. Above the reservoir are two small handles for handling the instrument and for aiding in driving it into the soil. A hydraulic pump is placed in the interior of the reservoir, and the piston-rod of

* The injector is manufactured by the Société l'Avenir Viticole, Rue de Brueys 73, Marseilles; and M. Vermorel, Villefranche, Rhone, makes the same slightly modified.

this passes at the top between and above the two handles, and seems to eject the desired quantity of liquid.

"The method of using is as follows: The apparatus is taken by the handles and the stem driven into the ground. If the power of the hands on the handles is insufficient to drive the stem as deeply as desired, the force can be increased by placing the foot on the pedal shown in the cut. As soon as the desired depth is obtained the piston is worked quickly up and down, producing the ejection of the liquid at the bottom of the hole.

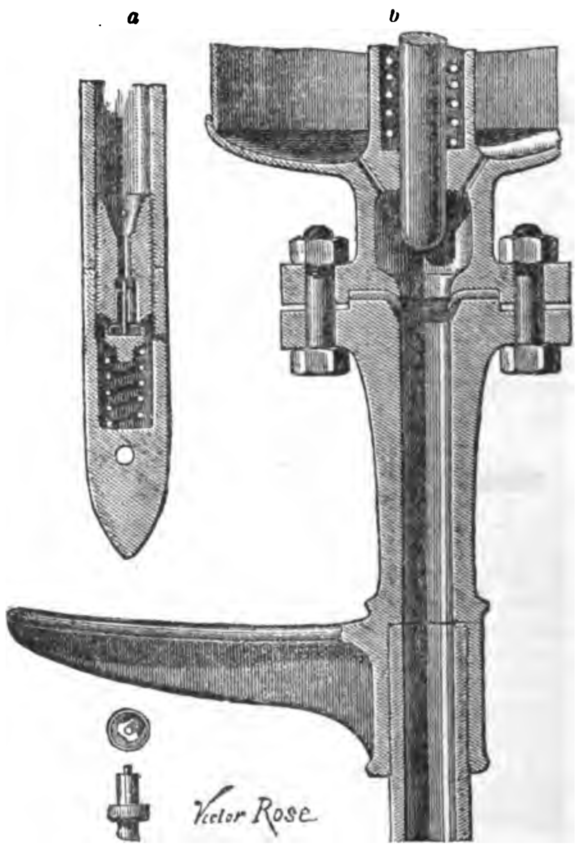

Fig. 21.

Details of Gastine Injector; *c*, valve.

The piston is then released and the interior of the reservoir is so arranged that the liquid for the next operation gets in the proper place automatically.

"The operation is thus reduced to the following: (1) Driving the stem into the ground; (2) working the piston-rod; (3) drawing the stem from the ground; (4) closing immediately, and with force, the hole made by the instrument.

"The quantity of bisulphide used with each charge can be regulated

by the length of the stroke of the piston, which in turn can be regulated by a ring on the piston-rod."

The depth of placing the charge must be from 0.3 to 0.4 of a meter, except when the liquid is placed near to the foot of a vine, when it should not be over 0.08 or 0.1 of a meter. The charges should be placed in regular rows parallel to the rows of vines and at intervals of 0.6 to 0.88 of a meter apart. * * * In light soils the liquid may be placed in the soil closer to the vine stocks than with heavy soils, but the charge must be put deeper in the ground than in the case of heavy soils, on account of the ease with which the liquid evaporates and diffuses.

In conclusion, the number of ejections of liquid to the square meter varies under different circumstances. The general rule can be established that the more the bisulphide is applied to the soil, in small doses, the better the diffusion of the vapors. But if the number of oper-

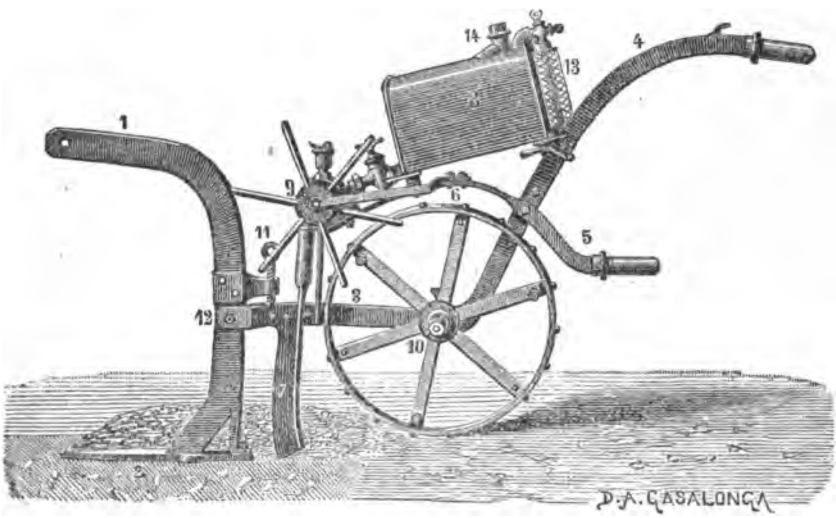

Fig. 22.

Bisulphide Plow of M. E. Vernette, of Beziers.

ations is made too numerous, the cost of labor will become too great. The mean number of ejections to the square meter is usually limited to two or three, and this will be found sufficient in soils of medium consistency. In compact soils, four will be found better.

Bisulphide Plows.—These plows are so arranged as to permit the deposit of bisulphide in a continuous line. These tools are of recent invention, but nevertheless their use is spreading rapidly. If the vines are planted in regular rows they permit rapid and economical work. As can be imagined, there are several types of these plows, and among the most used are those of M. Gastine, of M. Vernette, and of M. Saturnin.

The plow of M. Vernette (see Fig. 22) is most in use in Languedoc and is essentially composed of a share, 2; a receptacle, 8, which carries the liquid; an ejecting apparatus, 9, which gauges the amount of liquid flowing out of the tube into the bottom of the furrow; a wheel, 10, which covers up the furrow and communicates the movement to the

ejector, 9; and lastly, two handles, 4 and 5, the first to guide the plow when it is working, and the last to lift it at the end of a row.

The lines drawn by the plow should be about a meter apart at the greatest. According to Gastine and Couanon it is necessary to make but one furrow between the vines if they are 1 meter or 1.2 meters apart. If the spacing is from 1.2 meters to 2 meters, it is best to make two. If the espacement is between 2 and 3 meters, it is best to make three such lines of injection.

The plow must be regulated so that the delivery of liquid is proportional to the espacement; the tables prepared especially for each type of plow furnish the needful information on this subject.

Whenever a bisulphide plow is used, the soil is usually harder than with the hand ejector, and the depth at which the liquid is deposited is less, ordinarily about 20 centimeters at the greatest. It is consequently inadvisable to till the soil before this treatment (though some viticulturists seem to think it useful), for the loosening of the soil will give the vapor of the bisulphide too free access to the air.

At first the quantity used was entirely too large, and the operators did not think of the effect of the insecticide while trying to save their vines. Thus it was that Baron Thenard at first used 100 grams for each vine. Later M. Allies used 30 grams per vine. The Commission of the P. L. M. Railway Company was the first to propose two treatments each of 30 grams of bisulphide per square meter, which equals 300 kilograms per hectare, and two treatments thus calling for 600 kilograms per hectare (about 1,320 pounds for each 2½ acres). The members of this Commission now know that good results can be obtained with much less quantities.

The Viticultural Association of Libourne, working in a locality where the multiplication of the phylloxera is comparatively slow, and where, on account of the humidity of the soil, the loss of bisulphide by evaporation is small, decided upon the use of 250 kilograms (550 pounds) per hectare (2½ acres). To-day in certain localities where the pest is comparatively easily fought, not over 15 grams per square meter, or 150 kilograms per hectare (330 pounds per 2½ acres) is used. As low as 120 kilograms have been used. As a rule it may be said that the usual annual treatment calls for 150 to 250 kilograms per hectare.

Extinction Treatment.—It is also in place to speak of the efforts to extinguish the disease by destroying the vines, the method conforming to special laws adopted first in Switzerland and later in Algeria, Germany, and Russia. This method, excellent in countries in which the vines are little affected, has in view, by the application of a single strong dose of insecticide by means of an injector, to kill not only the insects but the vines, and to stamp out if possible all infected spots.

The Swiss law was enacted in 1878. The writer was charged personally, in 1882, by the Academy of Sciences, with a mission to study the efficiency of these measures of extinction, and we will reproduce here a portion of what we then said in a letter to M. Dumas.*

"In the two cantons of which the vines are attacked—Geneva and Neufchâtel—the bisulphide was applied at the rate of 300 grams per vine—150 grams being first used and 150 grams after an interval of twelve days. The vine was killed ninety-nine times out of one hundred,

* VALERY MAYET: *Comptes rendus*, November 20, 1882. For details, consult the *Comptes rendus* of the Academy of Sciences.

and the vines on the edges of the infected spot were always treated. Under this energetic treatment, all organized life was killed—such as snails, earthworms, all insects, weeds, vines—everything. Five rows of vines surrounding the affected spots were thus treated. As the treatment was not in circles but in square blocks, the number of vines destroyed is easy to calculate. Sometimes vines in a square 50 meters on each side were destroyed, involving 25,000 to 30,000 vines for each point. * * *

"The cost of this treatment of extinction, of visits by experts, of surveillance was met, one third by the Confederation, one third by the Canton, and one third by the Cantonal Council, in the form of a tax. This tax falls upon the vineyard proprietors exclusively, and is assessed according to the value of their vineyards. It varies from 5 to 15 francs per hectare. For the time being infected vineyard spots become virtually the property of the State; they are surrounded by a cordon supported by stakes, marked by a flag, and notice is put up bearing the words '*Vigne séquestrée*' (sequestered vines).

"For five years afterward no vines can be planted on such spots. Indemnity is paid for two years. The first year this equals the value of the crop, and the vine stumps, stakes, etc., which are burned on the spot. The second year the indemnity equals the value of half the crop.

"The most active search for infected vines is made in the month of July, the time when the most rootlets are produced, when the presence of the pest can be most easily discovered, and when the emigration of the winged and apterous insects begins. The treatment at this time of the year 'kills two birds with one stone.' It kills the pest and prevents emigration of the colonizing insects."

Can it be said, in view of these details, that the Swiss have solved the problem? Certainly not. The recent new attacks in the canton of Vaud and the extension of the pest in Neufchâtel prove that, in spite of all the energy displayed, the insect still spreads, and that it is likely any day to invade the thousands of hectares of vines on the northern border of Lakes Geneva, of Neufchâtel, and of Bienne. Nevertheless, it is true that though Switzerland has had the pest for about twenty years, the people, by an annual expenditure of 50,000 to 60,000 francs (the interest on a little over a million francs), have defended for a long time vineyards representing a capital of over a milliard of francs.

The French law regarding Algeria is dated March 21, 1883; the German law is of July 3d of the same year; the Russian imperial ordinance bears the date of February 5, 1885. They resemble the Swiss law in general tenor, except that Article 8 of the French law made the communes bear the expense of the annual campaign. "This disposition," says M. Couanon, Inspector of the Phylloxera Service, in 1886, "was not equitable, because it made all bear an expense for the sole benefit of a certain number and class. The communal resources are frequently insufficient; and the majority of Algerian vignerons object to the establishment of a special tax bearing on all vines. This proposition has been proved by the new law of July 28, 1886. By the terms of this law, the tax and its scaling—the maximum tax is 5 francs per hectare—is determined each year by decree of the Governor-General, with the advice of the General Council. The rate in 1887 was 3 francs, and the sum imposable on 50,489 hectares in three departments made the total resources 151,467 francs."

This sum is more than sufficient for the annual work; but the question arises, has the treatment by extinction been any more successful in Algeria than in Switzerland or Germany? In his report on the campaign of 1886, M. Couanon was evidently full of confidence in the future of our colony; but such is evidently not the opinion of M. Tisserand, who, in his report to the Phylloxera Commission, said that the situation about Philippeville in 1887-8 was very grave. "The infected spots," says he, "are disseminated over a massive vineyard area, and there is reason to fear that in spite of the energy displayed, the insect will extend its ravages very materially. About La Calle, the most important, the contagion appears well advanced."

To conclude: The bisulphide appears to be most efficacious in light soils; in the north of France, rather than in the central portion; and that the insecticide should be used at the first sign of invasion. In the northern portion of France, where the soils are cold and clayey, and where the multiplication of the pest is slow, sometimes the attacked vines will last ten years after being attacked, and under such conditions there is some hope in using the insecticide. The same cannot be said in the central portions of France, where the vine will sometimes die in two years. Even the most careful vignerons cannot meet the emergency, and the bisulphide can only be considered as an ameliorating agent. But if the aim is to treat the infected spots by extinction of all life, the bisulphide is the best agent that can be used.

Bisulphide of Carbon Dissolved in Water.—Owing to a number of accidents, where the vines were either killed or badly injured by using the bisulphide in its natural state, the idea of dissolving it in water occurred to many of our inventive minds. A more regular distribution of the insecticide in the soil is thus secured. At first the proposition was vigorously debated, but as the practice spread it received commensurate approbation. On this subject we cannot do better than to quote M. Foëx:

"M. Cauvy, Professor of Physics at the Pharmaceutical School at Montpellier, first proposed this in 1875, but he did not follow up the idea. In 1882, M. Rommier, who was studying the phylloxera question for the Academy of Sciences, made the same proposition. He studied, in the first place, the solubility of the bisulphide in water; and ascertained that it was about two grams per liter at an ordinary temperature. However, to avoid all accidents, he recommends that the quantity used be never more than 0.4 to 0.5 of a gram per liter."

"In practice," says he (Journal of Agriculture, August 26, 1882), "the operator must secure a reservoir provided with wings or stirrers (a species of churn as it were), in which to thoroughly mix the two liquids, the mixture being diluted afterward." * * *

The imperfection of this apparatus prevented, at first, the employment of the method, and it is only in the past four years, or thereabouts, that, thanks to the very ingenious apparatus devised by Fafeur Brothers, any considerable area of ground has been treated by this method.

Messrs. Fafeur Brothers describe their apparatus as follows:

"Figure 23 enables us to explain the principles and action of the apparatus.

"The shaft A B is contracted at O and the current of water flows in the direction of the arrow F. The pressure exerted by the current of

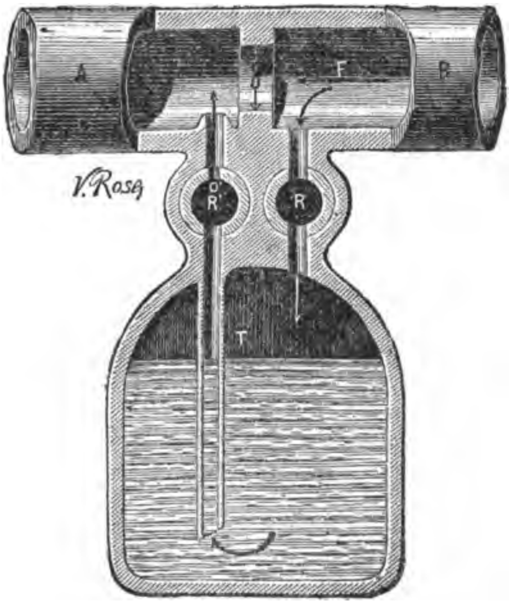

Fig. 23.

Plan of the apparatus of Fafeur for dissolving bisulphide of carbon in water. (According to M. G. Foëx.)

water (produced by the contraction at O) is brought to bear on the recipient, which is kept full of water and bisulphide, the latter, by reason of its greater density, occupying the lower part of the vessel. The pressure is transmitted to the bisulphide, which then rises in the tube T, passes through the stopcock R′ and the orifice O′, and comes out into the tube A, where it meets the jet of water flowing through O. The relative delivery of water at O, and of bisulphide at O′, regulates the proportions of the two liquids in the mixture; and the stopcock at R′ also regulates the delivery of bisulphide. A stopcock at R enables the operator to shut off the current of water flowing toward the bisulphide, when it is desired to re-charge the apparatus with bisulphide. * * *

"Inasmuch as the jet of bisulphide is created by the current of water itself, the proportions in the mixture will always be constant.

"As can be imagined, it is easy to adapt this system to many different conditions, and the current of water can be produced as desired, by pressure from a reservoir of water, by a hand pump or steam pump. For small operations the hand pump shown in Fig. 24 will suffice.

"The mode of treatment consists in previously digging a small basin around every vine stump, and pouring into each basin a quantity sufficient to equal 15 to 18 liters of solution to every square meter of surface; that is to say, if there are 8,000 such basins to the hectare, 20 liters can be placed in each one, which is equivalent to 16 liters per square meter. If there are 3,000 such basins to the hectare at least 50 liters should be poured in each; and if there are 2,500 basins, 60 liters in each. In very closely planted vineyards, two vines can be included in each basin, and

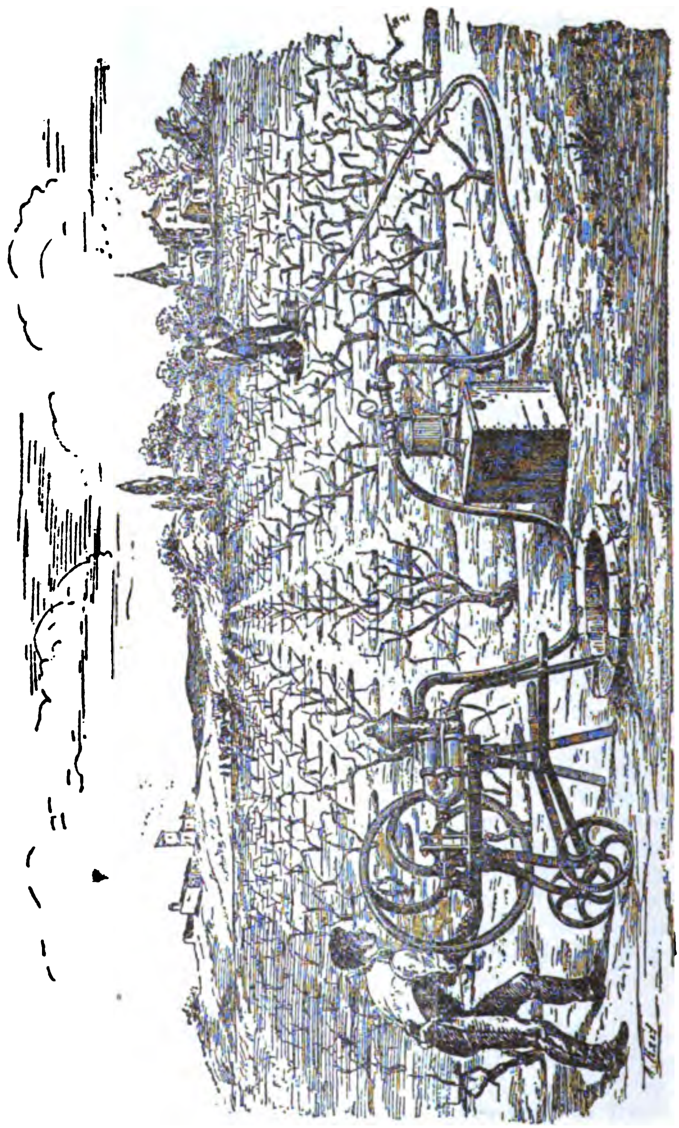

Fig. 24.
Adaptation of the Fafeur apparatus for a hand pump. (According to M. G. Foëx.)

if there are as many as 30,000 vines to the hectare, three vines can be included.

"If it is desired to treat only a small surface of the land, and if the water supply is convenient, a hand pump will suffice, and rubber hose can be used to carry the liquid to the vines to be treated. A man or boy can direct the stream as it comes from the pump into two tubs alternately, one being emptied while the other is filled."

For large or medium-sized vineyards a steam pump will be found better, placed on the border of a stream or at a well having sufficient

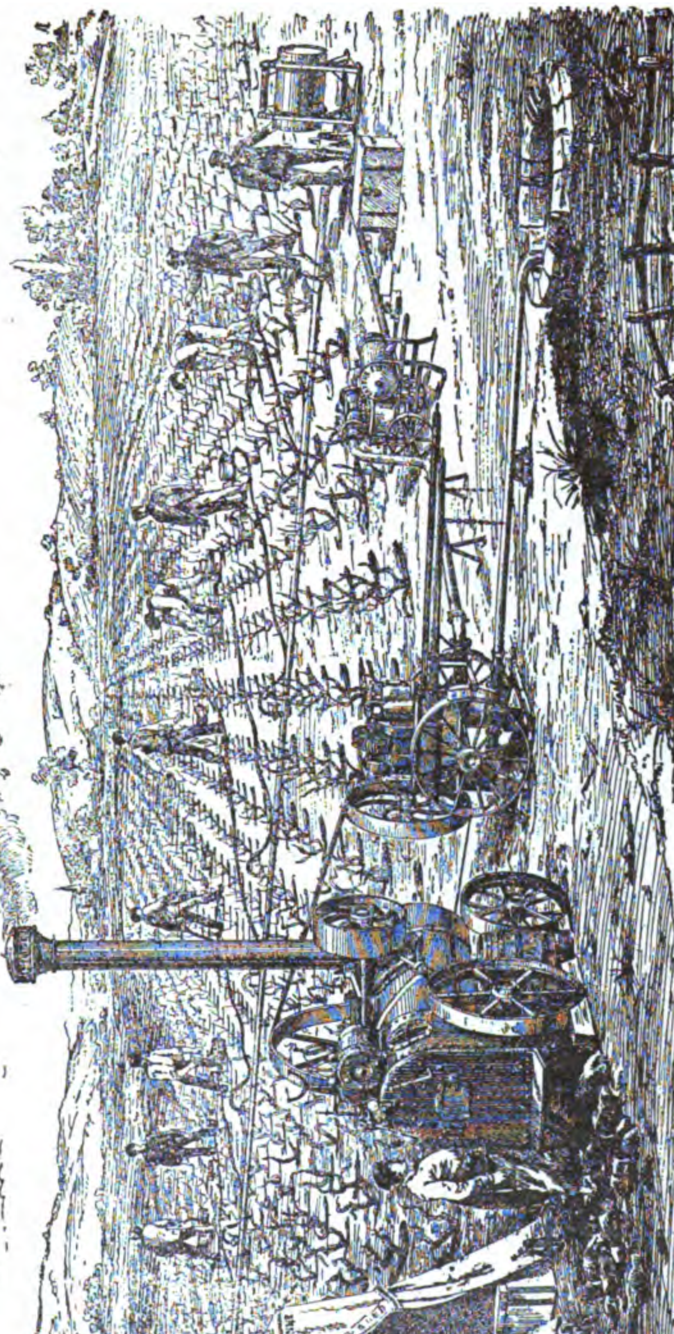

Fig. 25. Arrangement adopted for employing the Fafeur apparatus when a steam pump is used. (According to M. G. Foëx.)

water supply. The pump is connected with the dissolving apparatus. * * * The details can be seen in Figs. 24 and 25. * * * The treatment can be made at any season, excepting at the time of vintage.

As can be seen by the above details, about 1,600 hectoliters of water for each hectare of vines will be needed. More will be required if the ground is rolling. The process can only be applied when the water supply is abundant. In spite of this, the process tends, in the valley or rather the great plain of Aude, to replace the employment of bisulphide or the alkaline sulpho-carbonates. But can the French vines in this section be saved by this treatment? We do not believe it; but nevertheless we believe their death will be deferred for some time.

CHAPTER XV.

SULPHO-CARBONATES.

From the first invasion of the phylloxera, the discovery of an agent at once a fertilizer and an insecticide attracted the attention of chemists. Many experiments were made in that direction; but the idea that the sulpho-carbonates of potassium and of sodium would unite both qualities is due to M. Dumas. In 1874 he observed that under the influence of the carbonic acid in the air, and of humidity, these salts decomposed slowly, forming the carbonates (fertilizers) and bisulphide of carbon (an insecticide), and that, further, the slowness of the reaction gave the toxic vapors a long and efficacious action.

Experiments were then undertaken at Cognac under the direction of two delegates from the Academy of Sciences. Those intrusted to M. Max Cornu and M. Mouillefert resulted in a remarkable growth of rootlets.and that the insecticide did its work, and the sulpho-carbonate of potassium was found preferable to the sodium salt, notwithstanding its greater price. The fertilizing value of the potassium salts was already well known; bisulphide had been proved to be a powerful insecticide, and it was believed that the remedy had been found and that everywhere it would supplant the bisulphide of carbon treatment. That availed nothing. Though the process was ingenious and the name of its discoverer carries weight, practical work must decide.

The statistics given in 1888 by the Director-General of Agriculture (in his review of the situation pertaining to phylloxera) prove that the bisulphide of carbon still has the great preference among vignerons.

In 1886 the number of hectares of vines treated in France by bisulphide of carbon was 47,215, and the number treated by sulpho-carbonate of potassium was 4,459; the figures for 1887 were 66,205 hectares by bisulphide, and 8,820 hectares by the sulpho-carbonate. Comparing only these two years, it might be thought that there was a growing confidence in the sulpho-carbonate; but the year 1884 shows 33,446 hectares for bisulphide and 6,286 hectares for sulpho-carbonate; the year 1885, 40,585 hectares for bisulphide and 5,227 for sulpho-carbonate.

Why the relatively low proportion of sulpho-carbonate? We will explain by borrowing the words of an author from whom we have already borrowed freely:

"The sulpho-carbonate of potassium," says M. Foëx, "is employed

diluted in water, and water in sufficient quantity to saturate all the ground in which the roots live. Large quantities of water must be had, and this is one of the most serious objections made to the treatment. It must be applied in winter, the season when the vine is at rest and gets little nourishment from the sulpho-carbonate, while the soil is probably already well saturated with water. M. Mouillefert recommends, however, a second operation, to be conducted in the month of July, if the vines are already badly attacked, on account of the great multiplication of insects at this period of the year.

"Clayey soils are not at all favorable for treatment by this method; the insecticide penetrates such soils too slowly when they are already wet, and in this case the liquid remains too long in the open air and loses its efficacy. Furthermore, the potash does not get into such soils as quickly as desirable, and its fertilizing powers are not utilized as in other soils. Finally, as these soils warm up very slowly in the spring, the rootlets, which keep up the strength of the vine, are produced very slowly, while the facility with which these soils crack gives every opportunity for the insects to escape and enter upon new fields of attack."

APPLICATION OF SULPHO-CARBONATE.

"The sulpho-carbonate, dissolved in water, is poured into little basins dug at the foot of the vine stumps, and as soon as the liquid is absorbed by the soil they are covered up. The size of these basins varies according to the method of planting the vines and the declivity of the ground. If the vines are closely planted they may inclose two or more vines. Ordinarily this work is done by hand, but a plow may be used in certain cases, if the rows thrown up by it can be connected by use of a hoe. It is best to do this work but a short time before applying the remedy, as the freshly turned earth more easily absorbs the solution.

"The preliminary work done, the operator places in each recipient or basin the equivalent of 40 to 50 grams of sulpho-carbonate per square meter, mixed with 10 to 15 liters of water, according to the permeability of the soil; this represents a total of 400 to 500 kilograms of sulpho-carbonate and 100 to 150 cubic meters of water for every hectare treated.

"The economical transportation and handling of this great quantity of water has been the object of deep study on the part of Messrs. Mouillefert and Hembert. They have devised a system which appears to possess in a remarkable degree the necessary conditions of cheapness and convenience. Their system consists of: First, any sort of motor; second, a suction pump operated by the motor, together with suitable reservoirs for water; third, a special metallic system of canals, very light, and permitting of easy setting up and taking down; fourth, a secondary system by which the liquid can be conveyed to any part of the vineyard; fifth, a certain number of reservoirs at different parts of the system, which will permit the regulation of the pressure all over the treated vines; sixth, special receptacles for receiving and distributing the liquid, and in which it can be prepared; seventh, finally, apparatus for distributing the solution."

These tools are worked as follows, according to M. Mouillefert: "The pump and the motor are placed by the water supply. The water is carried to the principal canal system, then to the secondary system, which forms a network in the vineyard. At intervals of about 20

meters on this secondary system are stopcocks, to which can be attached rubber hose about 10 meters in length, forming a complete system of distribution. The liquid is distributed finally by two buckets or tubs of 350 to 400 liters capacity, easily handled by a man, which receive the water from the rubber hose. When one of those buckets or tubs is full, the needful quantity of sulpho-carbonate is added in order to treat a given number of vines. The mixture is agitated until the solution is perfect. The workman has then only to carry the solution by means of two watering pots, to the vines desired to be treated.

"The reservoirs, placed usually at elevated points, serve to accumulate water which is not for the time needed. * * *

"If the system is well organized, it will not be necessary to carry the solution at any place for a greater distance than 10 meters. Under such conditions a man supplied with two watering pots can empty at the foot of the vines, from 1,500 to 1,800 liters of solution per hour, without in the least being pushed.

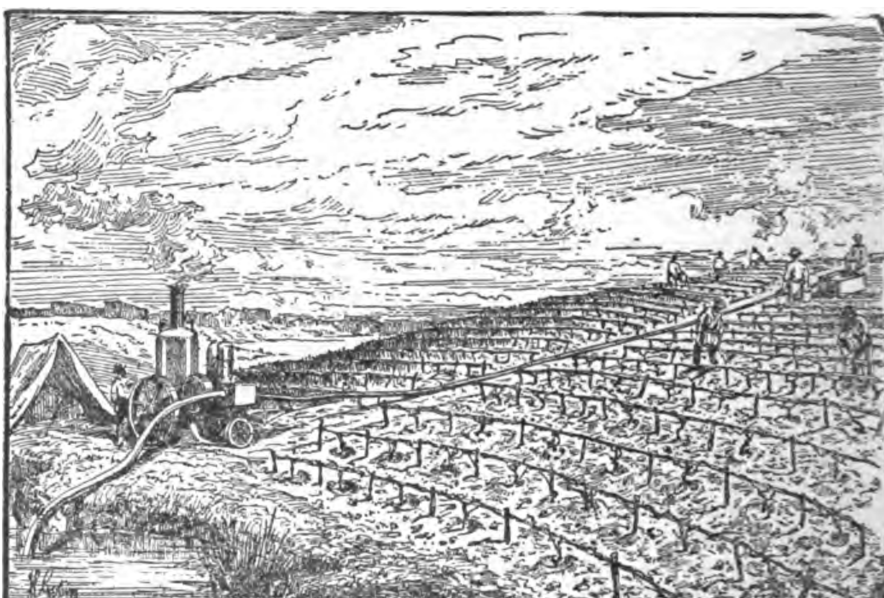

Fig. 26.

Treatment of a vineyard with sulpho-carbonate of potassium, according to the process of Messrs. Mouillefert and Hembert. (Extracted from the book of M. Barral: *La Lutte contre le Phylloxera.*)

"Notwithstanding the ingenuity of the processes thus described, and the considerable saving consequent upon their use, the employment of sulpho-carbonate is nevertheless more costly than that of the bisulphide. It is only where crops are large, or where there is reason to fear the use of bisulphide, or where there is already, by reason of the situation of the vines, a certain resistance, that the use of sulpho-carbonate is to be preferred. But under these circumstances there is the additional advantage of leaving in the soil a fertilizer very welcome to the vine, and the value of which must be deducted from the cost of treatment."

CHAPTER XVI.

LIME WASHES AGAINST THE WINTER EGG.

We have already treated very clearly the theory of M. Balbiani on the gradual diminution of the fecundity of the successive generations of phylloxera and its complete and inevitable extinction through this diminution of fecundity and the dimunition and final disappearance of the tubes of the ovary, were it not for the appearance of the sexual insects, which in a moment regenerate the race.

This manner of conceiving the cycle of life of the phylloxera is based on numerous facts and experiments, and until proved to the contrary must be considered as good. It is conformable to the logic that in insect life there can be no perpetuity of species by parthenogenesis, and at present there is no theory that weakens the premise.

In undertaking a campaign against the beginning and end of the species, the winter egg, we do not go far from a campaign against the entire species. * * *

On the 13th of January, 1882, in accordance with the views of M. Balbiani, the Superior Phylloxera Commission issued the following statement:

"Considering the importance of the rôle of the winter egg in regenerating and perpetuating the insect; and with a view of practically encompassing its destruction, not only in the laboratory but in the vineyard, the method of attaining this end becomes a matter of importance."

This statement, addressed to the Minister of Agriculture, was taken under consideration, and the experiments to follow were intrusted to M. Balbiani. But the needful preparations for a test on suitable ground took some time. During the winter of 1882–83 a first experiment was made, followed by others in the next year, which were crowned with success. Let us take the words of M. Balbiani:*

"The experiment consisted in choosing vines which habitually (naturally) showed many galls, and treating a certain number with the wash, while permitting others near by to go untreated. *Riparia* vines on the domain of *la Paille*, near Montpellier, were found to unite the needful conditions. The leaves (the vines were four years old) were covered each year with many galls. In the month of February, 1883, half of the vines were treated to a wash of a mixture of coal tar and oil, while the other half were not treated. Unfortunately this first experiment failed. It was expected that in the spring the galls would not appear on the treated vines and would appear on the untreated vines. As a matter of fact they did not appear on either; the season of 1883 was not favorable for the production of galls. Where they usually appeared in greater or less number, there were scarcely any. This was notably true with the vines of M. Laliman, of Bordeaux, where usually there are many galls each year.

"The experiment was repeated in the winter of 1883–84, and was this time crowned with complete success. M. Henneguy, who visited the experimental plot on April 10th, noted that the vines not treated showed numerous galls; on the contrary, where the vines had been treated, not a single gall could be found after a diligent search. The vines were

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* BALBIANI: *Compte rendu des Travaux du Service du Phylloxera*, 1885, page 157.

examined by Messrs. Couanon and Mouillefert on May 4th, and both of these gentlemen were struck by the clearness of the result. On June 1st, I examined them, in company with Messrs. H. Mares, Henneguy, and Couanon. At that date the difference between the two was more clearly defined than ever. On the vines not treated the galls had multiplied enormously in number, to the point of there being scarcely a free spot on the leaves, while with the vines treated the leaves were free from galls."

The writer can add that many visits to the experimental plots have convinced him of the efficacy of the treatment. While very efficacious in dealing with the insect, it is not without inconvenience to the vine. Certain vines appear to be injured, and the mixture of coal tar and oil can be replaced by a new mixture containing naphthaline, crude coal oil, lime, and water. The experiments at *la Paille* were continued until 1886, under the direction of M. Henneguy, and except in 1885, when, as in 1883, neither the treated nor untreated vines showed galls, the effect to the spring of 1886 was complete. What is also interesting to note, the action of the wash appears to act for a period of two years.

"At *la Paille*," says M. Henneguy, "the *Riparia* vines did not receive any treatment in the winter of 1886–7; however, I noted that on the 20th of April the vines treated in the preceding year carried but a very few galls, while the untreated vines bore very many."

After many changes in the proportions of the mixture, M. Balbiani has decided upon the following proportion for a quantity of 600 kilograms (1,320 pounds):

	Kilograms.	Pounds.
Crude coal oil	20	44
Raw naphthaline	60	132
Quicklime	120	264
Water	400	880
	600	1,320

In order to use the mixture a suitable receptacle is provided of sufficient size to hold the desired quantity. In a much smaller vessel the naphthaline is dissolved in the oil, a wooden stirrer being used. After having melted down the lime (the best obtainable) in the main receptacle, the mixture of the naphthaline and oil is turned in, and all the ingredients are ground thoroughly. All the water is not added at once, but, say, 200 liters are used at the start; 100 liters are used at the time of using the mixture, and the remaining 100 liters are used only if the mixture becomes too thick. The application to the vines is made by means of a stiff brush. All the wood is washed, the winter egg being concealed under the bark.

The different reports addressed to the Minister by Messrs. Balbiani and Henneguy contain in detail the experiments made on the experimental plots at Montpellier and elsewhere, together with particulars of the mode of application, etc. We refer the reader to the *Comptes rendus des Travaux du Service Phylloxera*, published by the Minister of Agriculture in the years 1885–86 and 1887–88, which contain the above-named reports.*

It suffices for the writer to say that the success of the experiments at *la Paille* attracted the attention of several vignerons, who have tried the remedy; that these trials have, in most cases, been combined with the

* HENNEGUY: *Compte rendu des Travaux du Service du Phylloxera*, 1887.

bisulphide of carbon treatment; and that the administration of Algeria employs the wash on the vines surrounding infested spots that have already been given the treatment for extinction.

According to the report of M. Henneguy (1887), about 750 hectares, distributed in eighteen departments, and 100 hectares in Algeria—altogether 850 hectares of vines—were actually treated. The French departments in which the remedy had been tried were Aude, Aveyron, Bouches-du-Rhône, Côte d'Or, Haut-Garonne, Hautes-Pyrenees, Hérault, Indre, Indre-et-Loire, Loir-et-Cher, Lot, Lot-et-Garonne, Rhône, Pyrenees-Orientales, Saxône-et-Loire, Tarn, Tarn-et-Garonne, and Var.

As said before, we cannot go into details. * * * Of the entire eighteen departments mentioned above, Lot-et-Garonne (150 hectares treated) is certainly the one in which the applications are the most widespread and interesting. In this department (where M. de Laffite of Lajoannenque is an indefatigable champion of the Balbiani washes) there are numerous adherents of the theory. M. de Laffite has personally used the wash for five years on two hectares, to the exclusion of the bisulphide treatment. The two hectares are isolated, and are thus sheltered as much as possible from the apterous forms. The soil is calcareous and clayey (*argilo calcaire*) and is very compact. In 1886, according to Henneguy, an examination of the roots showed that the insects found thereon had but few tubes in the ovary, indicating a marked degeneracy; the insects were few in number; the vines were flourishing. In other experimental plots the results, though less marked, gave reason for hope of success. But in 1887, according to M. de Laffite himself,* a study upon the experiments made with these insecticide washes solely—and even with the relatively good situation of the vineyard of Lajoannenque taken into consideration—was that "confidence in a decisive success of these insecticide washes employed alone, is sensibly less than in 1886." * * *

In spite of the theoretical excellence of the process; in spite of the experiments at *la Paille*, so clear in their results; in spite, even, of some successes attained in the vineyards, it is evident that if the insecticide washes are not accompanied by subterranean treatments with bisulphide of carbon, they are generally of little efficiency, on account of the causes which more than counterbalance their good effect. Among the first of these causes is the invasion of young aptera, coming on their legs from neighboring vineyards, or being carried by the winds, from whence no one knows. In all vineyards that are surrounded by phylloxerated vineyards, or those in which resistant vines are planted, it is useless to think of these washes. It is only in districts newly attacked or little invaded that they are of any use; and the writer advises, in conjunction, the employment of the bisulphide of carbon treatment.

* DE LAFFITE: *Compte rendu des Travaux du Service du Phylloxera*, 1888.

CHAPTER XVII.

SUBMERSION.

"*Vitis amat colles*," says Virgil. This is a poetical license which the viticulturist can translate: "If thou wishest good wine, plant thy vines on the hillsides." Science and experience add: "But thou wilt get little; if thou wishest thy vines vigorous and of large production, plant them in the valleys and give them water." Naturally the European vines prefer soils that are fresh and humid, most frequently on the river banks, where they do not suffer from frequent inundation. * * *

From time immemorial in the south of Russia the vine growers have inundated, voluntarily, in order to free the vines from their enemies. It is the same in Greece. * * * In the struggle against phylloxera, a contest which must be varied according to location, the inundation of the vines was thought of and recourse was had to it.

"As soon as the nature of the malady was known," says M. Chauzit,* "a resourceful viticulturist, Dr. Seigle of Nimes, starting with the physiological knowledge that air is necessary to the life of the insect, and that it cannot live in water, inundated his vineyard at Forbarot, in Vaucluse. Dr. Seigle is incontestably the first to think of asphyxiating the insect by means of water. This was followed by a note, reproduced in the report of M. Barral, to the Immigration Congress in the Department of Vaucluse, in 1876, a note in which Dr. Seigle expresses himself as follows: From the 26th of July, 1868, * * * using the water of the Durance, brought by a canal which surrounded my property, I inundated all of my vineyard for a period of twelve consecutive days, maintaining a depth of about 0.15 of a meter constantly. In October of the same year I again submerged the vineyard for twenty-eight days. In 1869 I made three submersions: One of twelve days in May, one of eight days in July, and one of twenty-eight days in October. Thus from July 26, 1868, until February 16, 1876, I had submerged my vineyard twenty times and I have obtained immunity from the pest, and my vineyard is at this time more prosperous than before the appearance of the malady."

"M..Louis Faucon did not begin to submerge his vineyard at Fabre (Bouches-du-Rhône) until 1870, as he has said in his memoirs placed before the jury at the Congress of Irrigation in 1876. But though it can be said that M. Seigle was the first to submerge his vines in France, it can be said with equal truth, and still more strongly, that M. Faucon was the inventor and propagator of the methods of submersion. In the course of many articles that appeared in agricultural journals he led the way that has been followed by submersionists; he has determined the principal rules governing submersion, and has contributed largely to the rapid extension of submersion, not only in the central portion of France, but in the West."

The figures of M. Faucon, giving the production of his vineyard before the invasion of the pest, during it, and during the time of submersion, have their own eloquence. They have become, as it were, classics, and merit being quoted. Of the vignoble of Fabre, near Tarascon (Bouches-du-Rhône), the 23 hectares belonging to M. Faucon produced:

* CHAUZIT and TROUCHAUD-VERDIER: *La Submersion des Vignes.*

	Crop, in Hectoliters.
In 1867, before the invasion of the pest was apparent	925
In 1868, year of the discovery of the insect (dung manure)	40
In 1869, second year of the invasion	35
In 1870, first year of submersion (no manure)	120
In 1871, second year of submersion (no manure)	450
In 1872, third year of submersion (rape cake)	849
In 1873, fourth year of submersion; frost (rape cake)	736
In 1874, fifth year of submersion (rape cake)	1,135
In 1875, sixth year of submersion (rape cake)	2,680
In 1876, seventh year of submersion; frost (rape cake)	507
In 1877, eighth year of submersion (rape cake)	2,235
In 1878, ninth year of submersion; frost (rape cake)	1,135
In 1879, tenth year of submersion (rape cake)	2,200

Three facts are revealed by these figures: (1) The destruction of the phylloxera; (2) The average production is more than doubled; (3) The frequency of spring frosts.

On account of the doubled production the proprietor will gain—and much—notwithstanding the loss in quality of the product, the frequent spring frosts, and the cost of installation, which is frequently large.

The example set by M. Faucon has been quickly followed in France, and to-day large tracts of land are submerged—more than 25,000 hectares in France alone. The official figures given by M. Tisserand, Director-General of Agriculture, in his report in 1888 to the Superior Phylloxera Commission, are 26,665 hectares. It can be added that if the cost were not so great, and if the necessary canals were created, these figures would be quickly quintupled. The canal of the Rhone alone, according to M. Dumont, well known in connection with one of such projects, will permit the inundation in winter of 80,000 hectares of vines.† * * *

For details of the subject of submersion we refer the reader to the special works enumerated in the bibliography, and particularly to those of Messrs. Faucon, Foëx, and Chauzit, from which we will make extracts. Some directions as to the conditions necessary to success and methods of executing submersion will be made here; and this as briefly as possible in the following lines:

CONDITIONS OF SUCCESS.

"Submersion," says M. Foëx (page 625), "is necessarily limited to vineyards situated on the plains. On hillsides it is necessarily out of the question. Further, in cold winters, accidents are risked during the operation. Sometimes the water freezes to considerable thickness, and a change of level of the water will do serious damage.

"Up to the present time in France, submersion has not spread in the southwest and beyond in the Gironde and neighboring departments; and in the southeast it is practiced in Var, Bouches-du-Rhône, Gard, Herault, Aude, Pyrenees-Orientales, Vaucluse, Basses-Alpes, and in Drôme. In the last named department it does not go beyond Livron, situated at the mouth of the Drôme, and which can be considered as the probable northern limit of the application of the process.

"Theoretically, in order to cover land lying absolutely level to a depth of 0.25 of a meter, 2,200 cubic meters of water to the hectare would be required; but, as is understood, the earth will absorb a large part of this quantity, another portion is lost by evaporation or escapes

† FAUCON: *Instructions pratiques sur la Submersion*, page 149.

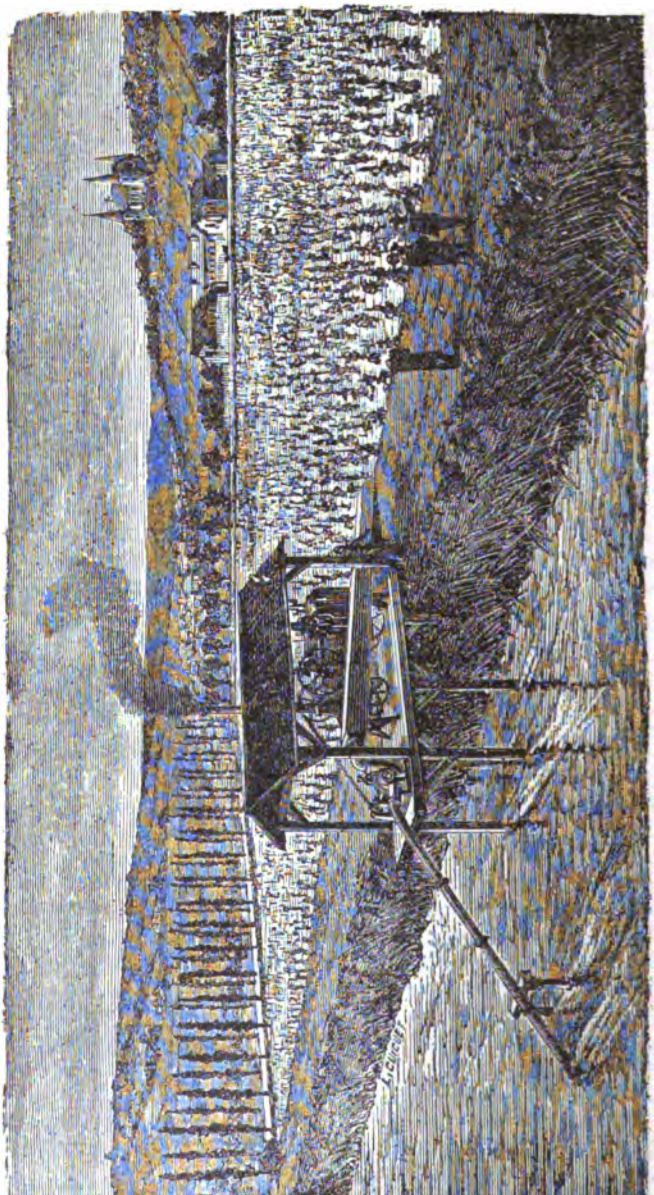

Fig. 27.
Submersion of a vineyard located on the border of a river, by means of a Dumont pump. (According to M. G. Foëx.)

in fissures in the levees, and so much greater water supplies must be arranged for. It is usual to arrange for 10,000 to 15,000 cubic meters per hectare, and sometimes as much as 30,000 cubic meters. A portion of this must reach the vineyards nearly continuously, in order to compensate for loss by absorption and evaporation.

Considered as an insecticide, the water which contains air, such as that pumped by machinery or has passed recently through chutes, is less efficacious, because the smallest bubbles enable the phylloxera to live. Those waters in which fertilizing properties are wholly wanting will exhaust the soil somewhat of such elements, in inverse ratio as the soils which they lave are permeable.

"But all this is of secondary importance. Any fertilizing material withdrawn from permeable soil by the water can be replaced by manure and thus renewed. The following formula, recommended by M. Faucon, will meet this case:

Rape cake	90 per cent.
Sulphate of potash from Strassfurt, refined, and containing 38 per cent of potash	10 per cent.
	100 per cent.

"These well mixed should be applied at the rate of 250 grams per vine."

Though submersion is more efficient against the insect when it is in full active life—in summer—no one thinks of applying the remedy at that time; the vines would suffer too much. In winter the cessation of vegetation enables submersion to be carried out without inconvenience. All of the hibernants do not die, it is true, but so few survive that their number is inconsiderable.

The duration of submersion is not the same in all soils and climates. Experience has shown, says Foëx, that in the northern limit in our region, in Drôme, the period can be reduced to 25 or 30 days, while it must be 30 or 40 days in Herault, Gard, and Bouches-du-Rhône. The more rapid multiplication in these warmer districts explains this.

"As to the efficiency of submersion," say Chauzit and Trouchaud-Verdier, "it is necessary that the soil be neither too compact nor light. The best condition is found when the level of the water, through the permeability of the soil, lowers from 1 to 5 centimeters every twenty-four hours. If the daily loss through this cause is 8 centimeters, the submersion will not only call for more water and require more time, but it will be less efficient; lastly, the process will be found very costly and inefficient if the water lowers 10 centimeters or more per day. This physical property, which we call permeability, results from the proportions of three elements necessary in soil: clay, silica, and lime. The more clay is present, the less the ground is permeable; and as the relative quantity of silica increases, the more easily will the water penetrate it."

The writer developed this theory in 1879, basing it on the number of air bubbles held (in the soil) in connection with the compactness of the soil.* We added that during submersion the soil must be constantly under water to a depth of about 25 centimeters. "The water," says M. Faucon, "which would not reach the lower roots of the vine if it

*V. MAYET: *Experiences sur l'efficacitè de la submersion des vignes.* (*Journal de l'Agriculture*, de Barral, Paris, August 7, 1879.)

was applied sparingly, will penetrate to the deepest roots if it is aided by the pressure."

The choice of vines to be submerged, says M. Chauzit, is not a matter of indifference. All varieties will not stand it equally well. The Aramon and Petit Bouschet have stood it well, but as they do not mature at the same time they should be grown separately. As for other varieties, the Carignan, Grenache, Terret, Chasselas, Oeillade, Morrastel, Espar, etc., are very much subject to cryptogamic maladies, such as anthracnose and especially mildew, to be submerged safely. They should be grown, when desired, grafted on American vines.

Having given sufficiently level ground, so that the squares for submersion will have a considerable extent; having a soil in which the needful conditions as to permeability cited above are found; the operator now proceeds to divide off the vineyard into rectangular plats.

"This disposition," says M. G. Foëx, "is the easiest for work, and it is that which corresponds best to the usual mode of planting the vines. If the ground is very level, these plats can be made quite large and square. If there is a sensible slope to the vineyard it is best to make the plats rectangular, so as not to be compelled to make the levees too high. If the destruction of the insects alone is considered, the larger these

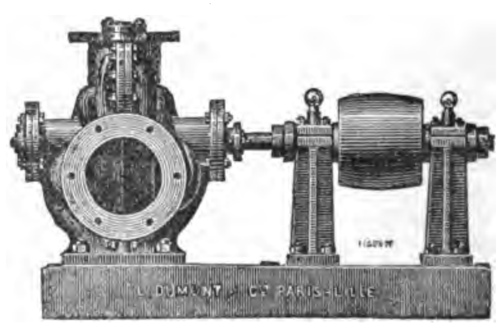

Fig. 28.
Dumont Centrifugal Pump, front view.

plats are made the better. The total length of the levees is less; and the roots which reach under the levees are rarely well purged of insects, constituting a center of infection, which it is important to diminish to the least possible point.

"But in general practice it is nearly impossible to push these principles to the extreme limit, which is to make a single submersion plot of all vines which it is desired to submerge. The four reasons which oppose this are most frequently:

"(1) The want of horizontality of the soil.

"(2) The impossibility of commanding at one time a sufficient supply of water.

"(3) The danger to the levees from shocks coming from waves raised by the wind.

"(4) The danger of counteracting the entire work, if a single break is made in the one inclosure.

"The inclosures of these plots are found in practice to be best when taking in from 3 to 20 hectares of land."

"The building of the levees inclosing the plots," says M. Chauzit, "must conform to certain rules. Thus they usually have a trapezoidal cross-section, with the sides at an angle of 45°. The size varies with the size of the plots. If these are of great extent, the levees can be of such size that hand carts can be pushed along the tops, making veritable dike roads. If the levees are more numerous, they can be from ½ to 1 meter in width at the top. The minimum height of the levees should be 0.65 meters; but in practice they usually run from 0.8 to 1 meter. The earth for these levees can be obtained by leveling higher spots."

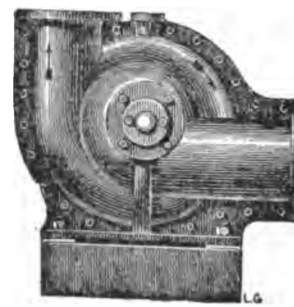
Fig. 29.
Dumont Centrifugal Pump, side view.

In order to protect the sides of these levees they can be planted with forage plants. M. Foëx advises clover (*Trifolium repens*), which easily bears humidity or dryness; but until the plants are well established—at least in the first year—it is desirable to protect the slopes exposed to the action of the water with vine canes, or reeds, or fascines.

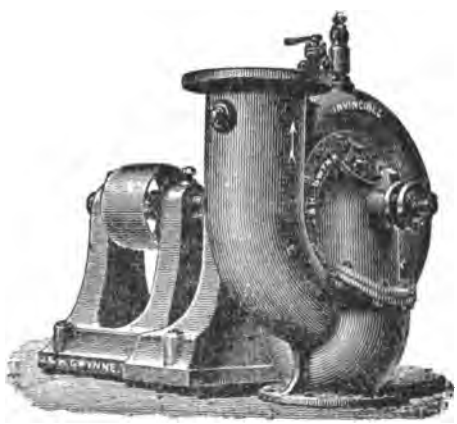
Fig. 30.
J. & H. Gwynne's Centrifugal Pump.

Once the levees and submersion plots are established, the question of water supply at the least cost becomes important.

"The water for submersion can come from watercourses, canals, ponds, springs, artesian wells, etc.," says Mr. Foëx. "It can be turned on the vines by a system of canals (gravity), or by means of pumping machinery."

The first of these methods is the simplest and cheapest, and should always be employed where the water supply has a higher level than the vines; it requires no other expense than the cost of making suitable canals. Unfortunately, recourse cannot be had in all cases to this method, and the second system must be employed. The most generally used lifting machines are rotary pumps.

The pumps that are most widely used in France are those of L. Dumont (Figs. 28 and 29) and of J. & H. Gwynne (Fig. 30). These latter constructors have devised a system for transporting the pump as desired, in which the pump is attached to a movable engine. (See Fig. 31.)

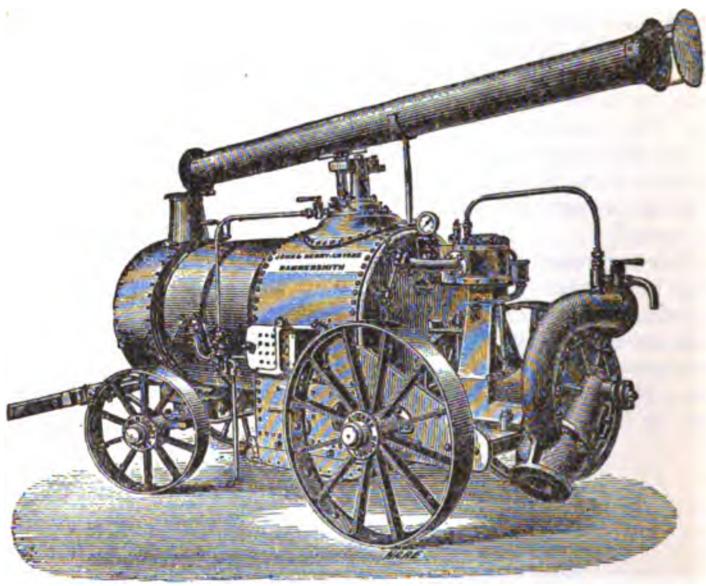

Fig. 31.

Centrifugal Pump of Gwynne attached to an engine.

Other machinery that will develop power can be employed, but the steam pumps will generally be found more desirable.

The different pumps mentioned here are usually operated by steam power; such power will generally be found the most easy to utilize. The cost of working by this means generally runs from 60 to 80 francs per hectare. This price is generally what is asked by the syndicates or societies.

The machinery is sometimes set up permanently on a commanding point, so as to reach by a system of canals the land to be submerged. Sometimes the machinery is movable, and is moved from place to place as desired.

The first system (immovable) should always be preferred where it can be applied. The work proceeds better and more rapidly than when the apparatus is moved about.

It is possible in special cases to utilize the power of a watercourse for driving the machinery. In such cases turbines or water wheels are used. Under such conditions submersion is very economical.

In conclusion, submersion is the only infallible insecticide process against the phylloxera, and it should be employed, every time, wherever possible.

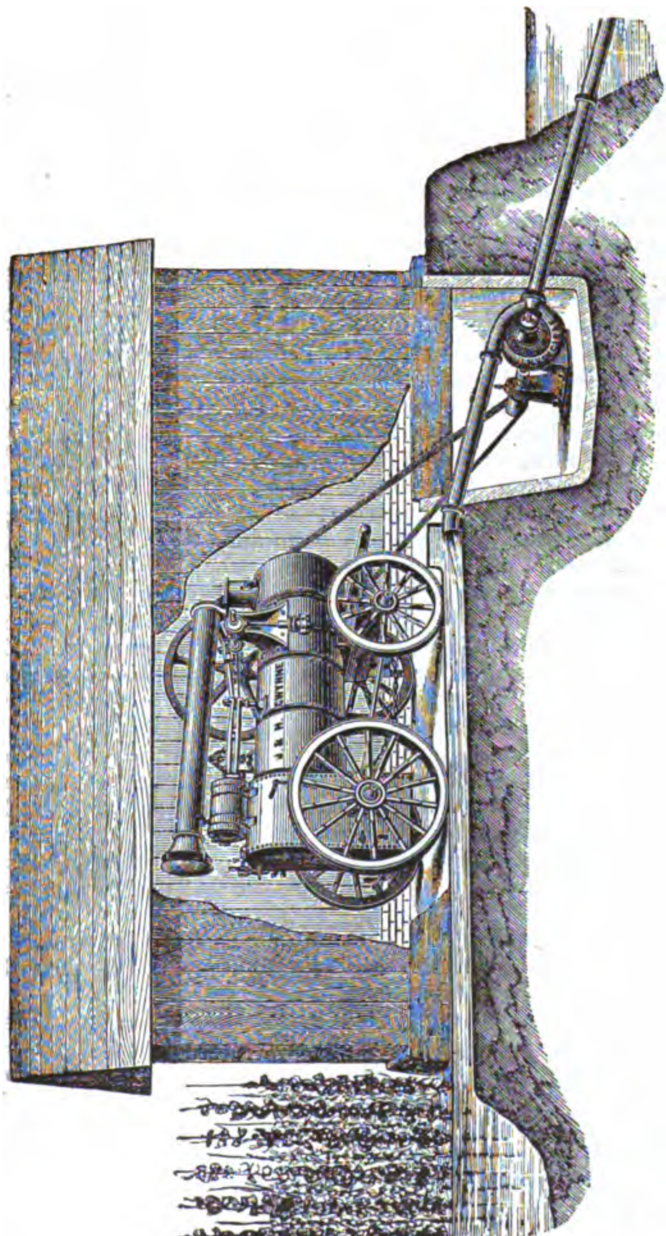

Fig. 32.
Movable installation of a Gwynne pump at the border of a river. (According to M. G. Foëx.)

CHAPTER XVIII.

PLANTING IN SANDY SOIL.

There remains for us to speak of the conditions under which European vines can live without any insecticide treatment; that is to say, in sandy soil, and by the use of American vines. When the phylloxera began its invasion the fact that vines still live in sandy soil attracted the attention of viticulturists. They did not agree, however, as to the causes of this immunity, and many theories are in evidence. We will cite but three:

(1) A mechanical action of the sand filling all fissures in the soil, slipping under the feet of the insect, and offering thus a barrier to their migration from vine to vine, and even to their circulation on the roots. This theory has many partisans.

(2) An insecticide action, badly defined, which cannot be called chemical, but which, according to Professor Marion, is incontestable, whatever be the explanation.*

(3) A physical disposition of the soil, which enables it to throw off the air which it contains and at the same time to be penetrated by water coming from rain, or which comes up from the subsoil by capillary action, thus killing the phylloxera by asphyxiation. This theory appears to be proved by experiment, and was developed at length by the ingenious M. Vannuccini in a memoir published in 1888.†

"In sandy soil," says M. Vannuccini, "when water comes on the soil, it goes between the innumerable interstices between the grains of sand, and as soon as a bubble of air is surrounded by water it forces its way to the surface. The following experiment will prove this: Take two vessels, one containing sand, the other clay. On pouring water into the one containing sand many air bubbles will come to the surface, while if water is poured into the vase of clay but few will come up. Between these two extremes are sandy clay soils which are easily penetrated by water and only a few bubbles of air remain when they are soaked. Thus it is that the gradation of resistance of vines in various soils can be accounted for. It can be seen that in pure sand the vines would be perfectly resistant, and as the proportion of clay in the soil increases the resistance is diminished until the vines die in soils that contain much clay."

The author compares this action to a natural submersion produced every year at certain periods, and freeing the vines periodically of the insects. * * *

This theory of M. Vannuccini has not yet been refuted by any one. It is not contradicted by the ideas of M. Marion, or of M. Barral, who, in a note to the Academy, has attributed an important rôle to the water in the subsoil rising by capillarity in the sandy soils of Aigues Mortes.‡

The more silica in the soil the more will the phylloxera be resisted. If the proportions of lime dominate, the resistance is less, as the calcareous properties tend to agglomerate. Such soils are those known geologically as the sandy soils of Montpellier (old Tertiary dunes), which

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* MARION: *Rapport sur les experiences contre le phylloxera et les resultats obtenus*, Campagne de 1878. Paris, Paul Dumont, 1879.

† VANNUCCINI: *Etude des terres ou la Vigne indigène résiste au phylloxera.* (*Mess. Agric. du Midi*, September 10, 1881.)

‡ J. A. BARRAL: *Influence de l'humidité souterraine et de capillarité du sol sur la Végétation des Vigne.* (*Comptes rendus*, February 12, 1883.)

contain a notable proportion of marl and shell debris mixed in them. If the sand contains salt it is harmful to the vine.*

"Except in low and salty lands, the vine appears to prosper in all land where the proportion of silica in the soil exceeds 60 per cent. The vine succeeds in the sand dunes of Gascony, the sea coast bordering the gulf of Lyons—notably at Aigues Mortes—and in the sea coast sands of Tunis and Algeria; finally, the vine succeeds in the alluvial sands of the valley of the Rhone and of other watercourses.

"All of the sandy soils in the vicinity of Aigues Mortes, now planted in vines, were formerly planted to madder; that is to say, they were the richest and worked the longest, and on them the best results as to quantity are obtained. Sometimes as much as 250 hectoliters of wine per hectare is obtained from these soils.

"The soil must be worked thoroughly by the plow following a subsoiler. The Aramon, Petit Bouschet, Cinsaut, Chasselas, and particularly the Piquepoule succeed best in sandy soils, provided they be properly manured. Farm manure has been used, but chemical manures are best."

Fig. 33.

Apparatus of M. Vernette of Beziers for enjoncage.

The writer has spoken of the advantages of having a sandy soil. There are also inconveniences and drawbacks. Sand is easily moved by the wind, and certain vines will be laid bare and others covered up by sand dunes. This drawback can be met by covering the soil (*enjonçage*).

"The operation," says M. G. Foëx, "consists in covering the sand with rushes or other marsh plants, which are worked into the soil by means of a share or a machine carrying several iron disks." (See Fig. 33.)

The small quantity of rushes that will grow in the sand can be removed by hoeing. * * *

* Common salt (chloride of sodium), which is valuable in small quantities as a fertilizer on soils in which it is wholly absent, sterilizes the soil if it is in excess. * * * The vines should be planted in spots sufficiently sandy and sufficiently above the level of the sea that the salt will not come up through the soil by capillarity.

CHAPTER XIX.

EMPLOYMENT OF AMERICAN VINES.

The vast and complex question of American vines (resistance, adaptation, grafting, etc.) which has given rise to so much controversy and has blackened (used up) nearly as much paper as the question of insecticides, is not to-day completely elucidated, but is entering on a period of calm and study, both theoretical and practical.

History.—"American vines were known earlier by the Europeans than is generally thought.* In the tenth century they already attracted the attention of the hardy navigators who preceded Christopher Columbus in the discovery of America. Christian Rafn, a Danish archæologist, who has collected a large number of documents on the voyages made by the Scandinavians from the tenth to the fourteenth century to the eastern shores of America, says that in the year 1000, Leif, the son of Eric the Red, left Greenland with thirty-five men to explore more completely the land visited by Biarne (Bjorn) in 986. He landed in Massachusetts, and a German named Tyrker discovered grapes, with which he supplied the boat. Since then many voyages were made, and Leif called the country Vinland.

"Adam de Breme (12th century) stated that the vine flourished in America; he knew it, he said, not by conjecture, but by the authentic accounts of the Danish. He gave as authority the Danish King Svein Etridson, nephew of Canute the Great."

The first attempts to cultivate the American vines by the European colonists were made in Florida, according to Bush and Meissner.† The same authors say: "The French colonists of Illinois, near Kaskaskia, made, in 1769, with the grapes from wild vines, one hundred and ten casks of heavy wine; but the quality, judged bad, made them decide that the European vine was the true wine-producing vine. In 1630, The London Company sent French vineyardists to Virginia to plant vines sent to the colony for that purpose, but the checks encountered then (and since by William Pernn in 1633, by the Swiss colonists in 1690, and at the close of the last century by Lakanal in Kentucky, Ohio, and Alabama), compelled the European colonists to abandon the effort. In the nineteenth century there have been a thousand similar failures, and not a single passable success; and Downing was perfectly correct in writing (Horticulturist, January, 1851): 'The introduction of European vines into America for cultivation on a large scale is impossible. There is first a season or two of promise and then a complete failure.' It is necessary always to except California, which to-day is the principal producer of wine in the United States, and all these remarks on the cultivation of European vines refer solely to the States east of the Rocky Mountains.‡ While the facts cannot be denied, the cause remains a

* G. Foex and P. Viala: *Ampelographie Americaine*, Montpellier, Coulet, page 1.

† Bush and Meissner: *Les Vignes Americaines, catalogue illustré et descriptif.* (Translated from the English by L. Bazille, reviewed and annotated by J. E. Planchon. Montpellier, Coulet, 1876, and 2d edition, 1885.)

‡ The constant failure of the European vines in America is one of the best arguments in favor of the American origin of the phylloxera, which was so long disputed. Though in California the European vine (Mission vine) has been cultivated for a long time, it was preserved from the phylloxera by the then impassable barrier of the Rocky Mountains, the phylloxera originating in the Atlantic basin. To-day the insect has cleared this barrier through the creation and ease of communications, and the European vines in California succumb to the insect, the same as do the vines in Europe.

mystery—a mystery which the discovery of the phylloxera and its work has since (Downing's time) explained. The Americans were thus forced to return to their indigenous varieties.

"The *Vitis labrusca* (G. Foëx and P. Viala) were found to give the largest crops, and it was with these that the first efforts were made. The active and persistent cultivators created a large number of varieties of this species. Soon afterward attention was drawn to the *Vitis riparia* and the *Vitis æstivalis*, and in the South to the *Vitis rotundifolia*. Then they sought to obtain, by means of hybridization, between the different species, or between one of them and European vines, new intermediate varieties, which to-day have an important position in American viticulture. Mr. Longworth, of Ohio, may be considered as the first to take up the cultivation of these wild vines, beginning about 1823. He has been followed by many well known in the United States, such as Underhill, Roger, Arnold, Adlum, Bull, Reckett, etc.

"The American varieties remained little known in Europe for a long time, owing to their inferiority for the table and for wine making. When such varieties as the York-Madeira and the Isabella were brought out their ornamental qualities were recognized, and the vines adopted for arbors, etc. It was not until 1861 that the Marquis de Ridolfi undertook, in order to escape from the ravages of oidium, to cultivate the Isabella on a considerable scale in his properties near Florence."

According to M. Planchon (*Revue des Deux Mondes*, 1877), the Catawba and Isabella were introduced in 1825; but the first rooted plants were taken to Europe in the years from 1858 to 1862. "By a singular coincidence," says he, "these introductions were made about the same time at different sections and countries of Europe—at Bordeaux, Roque Maure, England, Ireland, Alsace, Germany, Portugal."

M. Laliman, of Bordeaux, was the first to notice and announce, in 1869, the resistance of the vines of the New World. (Congrés de Beaune.) Mr. Riley affirmed this in 1870, especially as to the variety commonly known in the United States as the summer grape (*Vitis æstivalis*).

The first who thought of grafting was M. Gaston Bazille, President of the Agricultural Society of Herault. In 1869 he tried unsuccessfully to graft French vines on their American cousins. In 1871, having received some American canes, he succeeded in making them take on French vines,* and in the following year grafted French vines on American stocks. At the same time Messrs. Planchon and Lichtenstein succeeded in the same particular in their experimental fields.

In 1872, M. Victor Lefranc, Minister of Agriculture, imported, through the French Consul at New York, a quantity of American vines, selected by Mr. Riley, and which were distributed in Herault through the President of the Agricultural Society. In 1873 the resistance of American vines becoming more and more apparent, M. Planchon was sent by the Government to America to study these vines in their native country. From the time of the return of the learned professor, the movement spread rapidly, particularly at Montpellier, where the zeal and work of savants and practical men multiplied experiments. At two important experimental stations (the collection of vines of the National School of Agriculture at Montpellier, and the Departmental Phylloxera Commission—presided over by M. Henri Marés) permitted the examination of a

*G. Bazille: *Messager Agr. du Midi*, July, 1871.

great variety of vines. The collection of the National School, started by G. Foëx, contained, alone, about two hundred and thirty varieties of American vines. It is only just to associate with the names of the active workers mentioned above, that of the Director of the School, who, by his remarkable works, has taken rank as one of the first ampelographers of the time.

The viticulturists and savants of the Gironde followed in the movement. The example of M. Laliman was followed by a large number of vignerons, and M. Millardet undertook his experiments on hybridizing the American varieties with the vines of Europe.*

To-day, after many efforts, and in spite of the struggles, in spite of vexations, and in spite of drawbacks attending an absolutely new mode of culture, and using plants from extreme latitudes, the partisans of the use of American roots have triumphed in nearly every locality that has been badly attacked by the insect.

Of the three great questions—resistance, grafting, and adaptation—the first two have been absolutely settled. We have some vines twenty years of age grafted on such resistant stocks, and thousands of hectares of vines that have been grafted ten or fifteen years, to attest this success. The total number of hectares of reconstituted vineyards at the end of 1887 (see *La situation phylloxerique en* 1887–1888, by M. Tisserand), was 166,517. The American vine, in spite of its detractors, has proved its own case.

Among the many botanical species native to America, and belonging to the order of *Vitis*, the four following have been used in Europe on a large scale: *Vitis æstivalis*, *Vitis riparia*, *Vitis rupestris*, and *Vitis labrusca*.

Of the varieties most widely known of these species may be mentioned: Of *Vitis æstivalis*, the Jacquez, Herbemont, Black July, and Cunningham; of *Vitis riparia*, the wild Riparia, Solonis, Clinton, Taylor, Vialla, and Franklin; of *Vitis rupestris*, the different varieties of the wild *Rupestris;* of *Vitis labrusca*, the Concord, York-Madeira, and Isabella. Of late there have been used three other wild vines—the *Vitis cordifolia*, *Vitis Berlandieri*, and *Vitis cinerea*.

If there are still questions to be solved by those in favor of American vines, it is that the adaptation of different stocks to different soils is still open. The recent mission to America, undertaken by M. Pierre Viala for the French Government—a mission at the same time geological as well as botanical—will assist, we think, in solving this problem; but before attacking this subject we will say some words on resistance and the reasons for it.

Of grafting we will say little, referring the reader to the many works published on this vast subject. * * *

Resistance.—Considering this subject as a whole, and from the view of an observer, it can be said that ninety-nine times in a hundred a vine that is resistant in its country of origin will be found resistant in Europe. Have any cases been noted where an animal or vegetable species, transported from its native country, will succumb to natural parasites imported with it, parasites to resist which it is adapted? Ordinarily when any exotic species succumbs with us, it is when it meets conditions of soil or

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* These experiments, it is said, will enable the viticulturists to plant *direct producers* resistant to the phylloxera, where ordinary wine only is wanted, and will do away with the necessity of grafting.

climate to which it is not adapted, or when it meets new parasites. American vines, which grow in about the same latitude in their native country as the latitude in which vine growing is carried on in Europe, and in soils that are comparable, are found to resist the phylloxera, not finding new parasites to destroy them, and they therefore have every opportunity of prospering in Europe.

However, what are the causes of resistance? On this question we will quote from an author from whom we have already freely borrowed: "It was thought at first," says M. Foëx, "that the resistance of American vines was due to their vigor and ease with which they threw out new

Fig. 34.

Cross-section of a root of the Aramon (*Vitis vinifera*), non-resistant; enlarged 20 times. (According to G. Foëx.)

roots to replace those destroyed, and this faster than the insects could multiply in order to destroy the roots. This is an error. Decisive proof of this is obtained by a comparative examination of certain American and French types. The York-Madeira, for example, which is an American hybrid, has only a moderate growth and still resists very well, while the Aramon, of Languedoc, which is a remarkably vigorous grower, succumbs to its attacks. Another hypothesis was evolved by M. Boutin in 1876. This chemist thought that resistance of the American vines was due to the presence in the root of plastic matter, to which he gave the name of 'resinoidal matter,' a substance which opposed the loss of sap following the attack of the insect. This theory was founded on an incorrect conception of the phenomena following the insect's attack.

"There is, as a matter of fact, no loss of liquid from such cause. Furthermore, analyses at the School of Agriculture, at Montpellier, show that the degree of resistance is not proportional to the resinoid matter in the roots. We think that the reason must be sought elsewhere.

"The lesions produced by the phylloxera take on size according to circumstances. When the young rootlets do not have a woody body well organized, the swellings take on a considerable size and alter completely

the structure of the rootlet, ending in the death of the rootlet. When, however, the central cylinder of the root is woody the swelling grows to a size according to the thickness of the cellular tissues of the bark and according to their density. A very sensible difference is also shown in the extent of the changes in the roots of the *Vitis vinifera* as compared with the *Vitis riparia*, *Vitis æstivalis*, *Vitis rupestris*, etc. In short, with the *V. vinifera* the alterations reach all the different cellular tissues of the root, while with the varieties named the cortical coating alone is attacked.

The consequence of the penetration of the effects of the attack to the medullary rays (in the *V. vinifera*) is, after many attacks, the alteration of all the cellular tissues and the final destruction of the root. With the resistant vines the alteration of the root is but superficial, the wound cicatrizes and the root itself throws off the scar which results. * * *

Fig. 35.

Cross-section of root of Jacquez (*Vitis æstivalis*), resistant; enlarged 20 times. (According to G. Foëx.)

"The different varieties of the *Vitis labrusca* appear, in general, to be intermediate, from the point of view of these lesions and the conservation of the roots, between the two conditions we have established.*

These differences can be rationally explained by observing the corresponding differences in the structure of the tissue of the roots of various species. If roots of the same age, but of different species, are examined, it will be noticed that the roots of the American vines are more lignified. The bark is thinner and denser, the cellules in the root are smaller, the medullary rays are closer and more numerous, and the diameter is smaller than in the roots of European vines (see Figs. 34, 35, and 36).

* According to Millardet (*Les Vignes Américaines résistant du Phylloxera*), the property of resistance is at the maximum, and gives immunity from the pest, in the following species: *Vitis rotundifolia, rubra, cordifolia, rupestris, riparia, cinerea*, and *æstivalis*. It is more or less weak with the *Vitis candicans, californica*, and *labrusca*. It is nothing with the *Vitis vinifera* and *amurensis*, and also in all Asiatic species hitherto known.

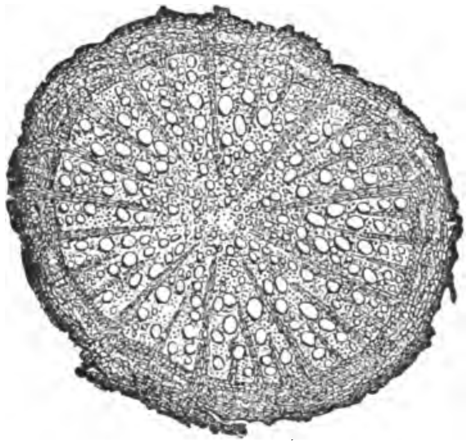

Fig. 36.
Cross-section of a root of the Solonis (*Vitis riparia*), resistant; increased 20 times in size.

Adaptation to the Soil.—We have heretofore stated that the only points unsolved as to American vines related to their adaptation to the soil. We have expected the vines to succeed in soils not suited to their growth (in chemical composition), or not suited from physical conditions, and numerous disappointments have been encountered in consequence. It is as though we wanted trees to succeed in a marly soil, when they were suited to a sandy soil—such as the chestnut and cork oak.

Professor Viala's mission to America, which resulted in the collection of many specimens of vines and soils, gave us, above all, much valuable information on this question. Professor Viala has seen and seen well. Vines, such as the *Vitis Berlandieri*, the *Vitis cinerea*, and the *Vitis cordifolia*, have been seen growing vigorously in marly and chalky soils as well as in white soils like those of the Charentes, the Champagne, and certain regions of the middle of France. There is no reason to think that those vines which succeed in America will not succeed in Europe. The problems will be settled by experiments under way.

As concerns the adaptation of American vines to different soils, these can be grouped as follows, according to Foëx:

(1) Deep soils, fertile and cool: Wild Riparia, Jacquez, Solonis, Vialla, and Taylor.

(2) Deep soils, rather heavy, not humid: Wild Riparia, Solonis, Vialla, Taylor, Othello, and Jacquez.

(3) Deep soils, moderately heavy, cool in summer: Wild Riparia, Jacquez, Solonis, Vialla, Taylor, Black July, and Othello.

(4) Light soils, pebbly, deep, well drained, not too dry in summer: Jacquez, Vialla, Wild Riparia, Taylor, Rupestris.

(5) White calcareous soils, chalky, marly, or tufaceous (travertines): Vitis Berlandieri, Vitis cinerea, and Vitis cordifolia.

(6) Gray clayey soils: Jacquez.

(7) Deep and very wet clay soils: Vitis cinerea, and Solonis.

(8) Deep sandy soils and rather fertile: Solonis, Jacquez, Black July, Rupestris.

(9) Dry, flinty, pebbly soils, arid, called the *garrigues:* Rupestris, Wild Riparia, Gloire de Montpellier, Grande, Glabre, etc.

(10) Deep soils, overlying tufa (travertine), and soils a trifle salty: Solonis.

(11) Soils colored red by iron peroxide, with silicious rocks (diluvium alpine), deep, and a little strong: All the varieties named above.

The American vines which succeed best in the olive-growing sections of France are: Wild Riparia, Solonis, Taylor, Rupestris, Jacquez, Cunningham, York-Madeira, and sometimes Herbemont and Vialla.

In the southwest the types preferred are: Vialla, York-Madeira, Solonis, Wild Riparia, Rupestris, Herbemont, Othello, Canada, and Noah.

In Savoy, Isere, Beaujolais, and Burgundy, good results have been obtained with Vialla, York-Madeira, Wild Riparia, Noah, Canada, Othello, Senasqua, Eumelan, and Cynthiana.

The principal direct producers are: Vitis æstivalis—Jacquez, Saint-Sauveur, Herbemont, Herbemont d'Aurelles, Black July, Eumelan, and Cynthiana; and among the hybrids, the Canada, Brant, Cornucopia, Othello, and Black Defiance.

The grafting stocks most employed are the Wild Riparia, Jacquez, Vialla, Taylor, York-Madeira, and Rupestris.

Such, described as briefly as possible, are the different methods used against the phylloxera. Placing aside the questions of submersion and of the effect of sandy soil, we will now state what should be done if the insect appears in vineyards neither capable of submersion nor on sandy soils. This is equivalent to saying what should be done in most cases:

First—If there are but few known points of attack, destroy these points by the "treatment for extinction," using bisulphide of carbon.

Second—Once the vineyards are affected to a considerable extent, but will produce profitably, cease the "extinction treatment" (which kills the vines), and apply the bisulphide of carbon remedy; and in case the attacked vineyards are isolated sufficiently, the Balbiani lime washes can be added.

Third—If the vines do not yield enough to meet the cost of treatment, pull them out and substitute them by American grafting stocks suited to the nature of the ground.

By proceeding as above, a goodly number of proprietors of Herault and especially of Aude, have maintained their yield of wine to the figures before the invasion of the phylloxera.

BIBLIOGRAPHY.

There has not yet been published a complete bibliography of the phylloxera. The work was undertaken seventeen years ago by Messrs. Planchon and Lichtenstein. Under the title of "Faits acquis sur le Phylloxera et Revue bibliographique," at the thirty-fifth session of the Scientific Congress of France, held at Montpellier in 1872, these authors published the first article, which was followed by others; but after the list included one hundred and twenty pages it was discontinued.

If the writer dreamed of publishing such a work to-day, the material would fill an enormous volume of doubtful utility. * * * It will be

sufficient, we think, to give some pages of references from which useful information can be drawn. In order to "separate the wheat from the chaff" we will draw from five principal sources:

(1) Comptes rendus Academie des Sciences de Paris.

(2) Faits acquis et Revue bibliographique (1872), by J. E. Planchon and J. Lichtenstein.

(3) Littératur générale œnologic, by E. Wagenmann. (Annal der œnologie, Heidelberg, 1880.)

(4) Monographie du Phylloxera, by E. Delamotte. (Alger, 1885.) A work in which about forty pages are given to bibliography.

(5) Notes bibliographique sur le Phylloxera of the Cours Complet de Viticulture, by G. Foëx.

We will adopt the same plan of division of the questions as in the last named work.

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Id.: Sur une Maladie de la Vigne actuellement régnante en Provence. (Comptes rendus of the Academy of Sciences, Paris, Aug. 3, 1868, page 333.) In this paper the root phylloxera was described by M. Planchon, under the name of Rhizaphis vastatrix.

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SIGNORET: Le Rhizaphis vastatrix (Planchon) doit être placé dans le genre Phylloxera (Boyer de Fonscolombe). (Bulletin of the Entomological Society of France, Aug. 12 and Sept. 23, 1868.)

J. E. PLANCHON: Nouvelles observations sur le Phylloxera dèscouverte de la forme ailée. (Comptes rendus, Sept. 14, 1868.)

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APPENDIX E.

POSSIBLE TRADE IN MEXICO.

POSSIBLE TRADE IN MEXICO.

San Francisco, September 1, 1894.

To the Board of State Viticultural Commissioners:

Gentlemen: Under instructions from your Executive Committee to investigate the possible market for wines and brandies in Mexico, I beg leave to submit the following reported interview with Mr. W. J. Parker, of the Mexican Central Railway, together with other statistics furnished by him.

WINFIELD SCOTT,
Secretary.

INTERVIEW WITH W. J. PARKER.

Mr. Scott: Mr. Parker, I understand that you are the agent of the Mexican Central Railway, and that your business here is to devise some means of obtaining a market for California products, and particularly wines, in the central and eastern portions of Mexico?

Mr. Parker: Yes, sir; that is correct.

Q. Has any effort yet been made by California shippers to develop this market? A. No well-developed effort has been made. From time to time California firms have, by correspondence and by traveling men, tried to sell wines in Mexico, but as they have taken no pains to study their trade or its demands in an intelligent manner, they have failed to be successful. To explain, I will say that the manner of conducting business in Mexico is different from what it is here, and to be successful you must, to a very great extent, conform to the manners and customs of the country in doing business with its merchants. To attempt to hurry the merchant in his buying is a wrong move. To be successful, study the people, their manners and methods, and then conform to them, identifying yourself with them and with their interests. Lack of doing this is the reason that Americans have not been successful in conducting business in Mexico heretofore, and by doing this the French and German element have held the trade. Since the advent of the railways the manners and customs of the country have been undergoing a change for the better.

Q. What firms have been engaged, so far, in developing this? A. Gundlach & Co., Carpy & Co., the Wine Growers' Union, B. Frapolli, and others.

Q. Give us a history of what has been done, so far as you are able. A. I do not know that I can give you a very correct history. Last year I was sent up here by the Railway Company to look over the situation. Through the newspapers the matter was made quite public, and immediately following my visit here the California Wine Growers' Union were the first to take the matter up, and sent a man down there. Other

companies have had men down there, but they have never worked the country systematically. They send a man down there, and he will visit a few of the best towns and probably sell a bill of goods. Some men have gone down there who have sold nothing. That was more the fault of the man that was sent than the goods.

Q. What is the character of the trade down there? In asking this question I mean, do the higher class of goods take well, or the wines of a lower grade? A. I would say that the better class of goods would pay best, and when introduced would take better. So far as I know, the wines sold there have been in price from 65 cents a gallon up. That, of course, does not include the freight—simply 65 cents f. o. b. at San Francisco—and the rate of freight would be $1 25, U. S. coin, for carload lots, and $1 52 for less than carload lots to all common points.

Q. How many common car points are there? A. There are six—Pachuca, City of Mexico, San Luis Potosi, Puebla, Lerdo, and Torreon, Mexico. We could make this same rate to any point.

Q. And this rate would include from any common California shipping point? A. From all California terminals and points intermediate thereto.

Q. What is the duty on wine in Mexico? A. Duties on wine, red or white, in barrels or kegs, 10 cents a kilo, gross. The same in bottles, 20 cents a kilo, net.

Q. And what is the duty on brandy? A. 30 cents in kegs and 50 cents in bottles or jars, net.

Q. In answering the question as to the quality of wine that would take in Mexico, would you advise dealing through a commission house in Mexico, or would you advise establishing a central depository in the City of Mexico and making that a point of distribution? A. The latter, I should say.

Q. How would you advise establishing such a depot? A. I should say that the best way would be for a number of the producers of the representative wines to select some one of their number, or some one interested in the wine industry of the State, and send him to Mexico, first, to look over the field carefully, and then, if decided best, to establish a wine depot, such as you mention, in the City of Mexico; and that these producers furnish their stock in carload lots, giving such wines as they could furnish at all times—in other words, establish a reputation for certain brands of wines. If those wines are placed there in a depository of that kind, with some one in charge who has an interest in the business, I am quite sure that the result would be much better than by sending traveling men. You know very well that if you send a traveling man out on a salary he does not do the work that a man would who has an interest in the business. It is a matter of dollars and cents to a man who has his own stock in the business, more so than to a traveling man who is working on a salary. From the City of Mexico, which is a central distributing point for the whole country, you can reach out to all the outlying towns for hundreds of miles. Everything in the business line of the Republic of Mexico is virtually based on what is said and done in the City of Mexico—in other words, that is the governing market of the whole country. All prices and freight rates are made with reference to the trade of Mexico City. Never sell one class of wine and deliver another; or, in other words, if you sell a certain grade by sample, see that the goods delivered are up to the sample in every particu-

lar. Carry out instructions from the buyer to the letter. Some may seem ridiculous, or behind the times, but it is not for the shipper or seller to determine this. Watch the shipping clerks, and see that they do not shirk or assume responsibilities.

Q. About how large a stock of wines would you think would be necessary to start the depot in the city? A. That I am unable to say.

Q. It would depend largely on the quickness of transportation from California, would it not? A. Yes, sir; and that can be made at the present time very quickly, and, so far as we are concerned, we should take special pains to furnish any shipments of that kind in carload lots quick transit, and I do not think it advisable for you to move goods in any less than carload lots on a proposition of that kind. Of course, if you could make a sale somewhere in the country of less than a carload lot, we would give the matter the utmost dispatch possible, but naturally carload lots take the preference.

Q. What is the average time for the transportation of freight to the City of Mexico? A. From six to ten days from California terminals.

Q. From what you have said of the trade in the central and eastern portions of the country, what character of wines are they now drinking? A. The wines drank in Mexico have heretofore come mostly from France, and, so far as I am capable of judging of the common table wines, I do not think they are in any way equal to the California wines. The red wine, *vino tinto*, as it is called, is mostly used on the table.

Q. Is it a light or a heavy wine? A. I should say it was rather light.

Q. The demand for white and fortified wines is very small there, then? A. The white and fortified wines are in better demand among the upper class, who have more education upon the subject and are better qualified to discriminate between the qualities of red and white wines.

Q. It is the middle class, then, who drink most of the red wines? A. Yes, sir.

Q. Have you any idea of the volume of foreign wines shipped into Mexico? A. At the present time not any. I asked our General Freight Department for figures on the subject.

Q. I think I saw some figures in the report of the Bureau of the American Republics that it amounted to something like $800,000 a year? A. That I am unable to say. The statistics will have to be obtained from the State Department of Mexico.

Q. How about the credits of the country? For instance, if a man would sell wine from his central depot in Mexico to various dealers or wine handlers in other cities, what credit would he have to extend to the purchasers? A. Well, that would depend largely on the firm. Some firms do a cash business; others give as much as four months' time. In that matter you would have to have a man there who could discriminate in these matters and see the best way of handling them. The merchants heretofore, in buying wines in France and other foreign countries when goods were bought on long time, were used to getting from four to six months' credit. That has been the custom of the country, and I think that from three to four months' credit has been the usual rule, when it is not paid in thirty days. Terms on United States goods sold in Mexico are many times *spot cash*. The dealer very often has an agent or correspondent in New York, or in whatever city he may be trading with, and these agents are usually a commission or forwarding firm, to whom he directs the goods to be delivered, and the latter pays the bills, deducting

an allowance of 2½ to 5 per cent commission. The establishment of a wine depot would save the merchant this commission, and be an inducement for him to buy his goods of such a depot. Failure among the better class of merchants is of rare occurrence, and in their dealings they are fair and honorable.

Q. What chance would California wine have to compete with the French production? In this connection what freight rate do the French pay on red wines, for instance, from Bordeaux to the City of Mexico? A. I am unable to say what the through rate is. The rate from Vera Cruz to the City of Mexico is $33 15 for one thousand kilos. This $33 15, of course, is in Mexican money. The premium at the present time is 95 per cent.

Q. And what number of people would be served with wine from the City of Mexico as a distributing center? A. The population of Monterey is 40,000; Saltillo, 25,000; San Luis Potosi, 40,000; Morelia, 30,000; Toluca, 15,000; Mexico City, 350,000; Jalapa, 15,000; Orizaba, 10,000; Puebla, possibly 100,000; Pachuca, 25,000; Oaxaca, 30,000; Juarez, 15,000; Chihuahua, 20,000; Lerdo, 10,000; Durango, 30,000; Zacatecas, 50,000; Agua Calientes, 35,000; Irapuato, 5,000; Celaya, 5,000; Leon, 70,000; Guanjuato, 60,000; Guadalajara, 100,000; Queretaro, 35,000; Tampico, 10,000. In addition to these there are Jiminez, 5,000; Fresnillo, 5,000; Lagos, 20,000; Siloa, 15,000.

Q. What percentage of the total population would you estimate lives on the central plateau, and is directly tributary to the city by rail connection? A. You might say all that I have mentioned.

Q. What percentage of the total population of the country? A. That I cannot tell you.

Q. Sixty per cent? A. All of that, I should say, live in those towns, or are supplied by merchants who are doing business in these various cities with branches in the interior towns.

Q. Now, as to the character of the people—are they wine-drinking people or a brandy-drinking people? A. Both. They drink a great deal of cognac. The better class of them are great drinkers of wine. They drink *vino tinto* and the heavier Spanish wines.

Q. Is there any prejudice in the country against American productions? A. No, sir. Among the better class of Mexicans, American productions of all kinds are taking well. There are many reasons for this, the principal one being that they can obtain their supply by rail quicker than they can by vessels, and while a few years ago nearly everything came from Europe, the balance of the trade at the present time is largely in favor of the United States, in all its branches. For this reason, a merchant carrying a hundred thousand dollars of stock can carry a larger assortment if bought in the United States than by buying in Europe. It takes from four to six months to give an order and get the goods in the store from Europe, whereas, in the United States they can order by telegram, if necessary, in such quantities as they may need for their actual trade, and have fresh goods on the way at once. They see the advantage of this, and avail themselves of it readily.

Q. Now, as to climate. In the central portions of Mexico, do you think that, from your experience with the average temperature there, there would be the same difficulty that California shippers experience in shipping to hot climates, like New Orleans, for instance? A. The average temperature of the City of Mexico is 62°. In some portions of

the interior the average temperature may go as high as 65°, or possibly 70°, the year round.

Q. What facilities are there for cellars in the City of Mexico, for instance? A. There are no cellars.

Q. How would the wine be stored? A. The buildings in the City of Mexico are of adobe or stone, with very thick walls, making the interior very cool and the temperature very equal.

Q. And rents? A. The rents are lower in proportion, I should say, than in San Francisco.

Q. And the cost of labor for handling wines? A. Is very low.

Q. How would you advise handling wine that has been sent to the depot? Would you think it would be best to sell it under the brand of the California producer or under the brand of the buyer who might purchase his stock from the central depot? A. I should say if possible handle it under the name of the producer. If this is not possible, and the buyer wishes to appear as an importer of California wines, give them the label as California wines imported by whoever the buyer may be.

Q. How much wine was shipped into this section referred to last year over your line? A. The wines from California to various points in Mexico was 276,860 pounds.

Q. Now, Mr. Parker, are there any other points of interest you may have omitted that you may think of that will be of value to us? A. At the present time I should say no. I have written to Mexico for data concerning the importation of wines from Europe and some other general information, and as soon as I receive it I will submit it to you, but that will be a week or ten days. As an additional suggestion I would say that, knowing the habits of the people, I am sure it would do well to place a café in connection with a wine depot, where nothing but California wines were served to the customers under *no* other brand than California wines, and at a purely nominal price, simply enough to cover the cost of production and handling, and to be served in such manner as to give business men a chance to see and sample the wines and at the same time to allow them to have the privacy necessary to conduct little business transactions, or to meet their friends. Such cafés are a common thing in the old country, I am told, and are arranged so that everything going out would be in the form of an advertisement. In addition to this, send to all the outside customers and friends, and to those you may wish to reach, cards of invitation, asking them when they come to the city to call, and to make this wine depot or café their headquarters, and have them ask their friends to meet them there. I think that this could be done with very little additional cost, and, if properly managed, would be not only a source of revenue, but one of the best plans of advertising that could be arranged. Get some of the prominent men to go to a place of this kind, and get their opinions, and the rest will follow. All of this will take some time and policy to work, but I am confident that it can be done.

MONEY AND CLIMATE.

At the present time the United States dollar is worth two Mexican dollars, while so far as hotel accommodations and meals are concerned a Mexican dollar in Mexico will go as far as an American dollar in the United States.

We shall be very glad to give you any additional information in our possession if you will only let us know what you desire.

Daily Temperature in Shade. (*1893.*)

Date.	June.			July.			August.			September.		
	Max.	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.
1	84	57	70	68	55	61	72	54	61	71	54	61
2	79	62	68	68	55	60	74	53	63	70	53	59
3	76	58	65	71	53	61	74	57	64	72	53	61
4	73	55	63	73	55	62	78	56	64	72	52	61
5	73	55	63	73	54	61	75	56	63	72	55	62
6	69	55	60	73	55	62	75	55	63	75	55	64
7	59	54	55	74	54	62	75	56	63	75	55	65
8	68	52	58	59	54	55	70	54	63	77	56	65
9	72	55	49	67	53	59	77	55	65	76	54	64
10	74	57	63	68	55	59	76	55	64	74	51	62
11	72	56	63	72	54	62	75	55	63	76	50	62
12	75	55	64	72	52	61	72	55	62	73	50	62
13	79	56	64	72	54	61	75	56	63	74	48	60
14	76	56	65	71	55	61	72	56	61	73	51	61
15	78	57	66	67	55	59	67	56	62	72	57	62
16	75	56	65	68	55	60	69	56	61	71	54	61
17	75	56	65	68	54	60	73	55	63	71	53	60
18	73	53	64	72	55	62	73	55	62	71	55	62
19	76	55	64	69	54	60	73	55	62	73	55	62
20	74	55	64	68	52	60	73	55	62	71	54	60
21	79	55	64	68	53	59	75	55	64	71	55	61
22	74	56	63	75	53	61	75	51	63	71	55	62
23	73	55	62	68	55	60	75	54	64	68	52	60
24	75	55	63	72	53	62	74	55	64	67	55	61
25	74	55	64	74	54	62	73	55	62	70	55	61
26	77	54	63	75	53	61	74	57	63	66	55	59
27	74	56	63	71	54	61	74	53	62	70	54	61
28	73	56	62	77	53	63	72	53	63	73	53	61
29	69	56	61	71	55	62	73	55	61	73	54	62
30	72	55	61	79	56	64	75	54	62	73	55	63
31	------	------	------	73	63	62	70	55	62	------	------	------

Yours, truly,

E. A. WHITE.

FREIGHT RATES ON FOREIGN WINES TO CITY OF MEXICO.

[Copy.] CITY OF MEXICO, July 18, 1894.

Mr. W. J. PARKER, *San Francisco, Cal.:*

DEAR SIR: In reply to your favor of the 27th of June, regarding freight rates on foreign wines to the City of Mexico. The last shipments brought in from Barcelona were charged for at the rate of 8 pesetas per 100 liters, plus 10 per cent primage, to Tampico. From Cadiz the charge was 60 pesetas per cubic meter, plus 10 per cent primage, to Tampico. From Bordeaux the charge was 50 francs, plus 15 per cent primage, per Bordeaux ton, to Tampico. Our rate is, as I have already stated, $33 35 (Mexican silver) per 1,000 kilos, Tampico, ship's side, to City of Mexico.

Yours truly,

A. L. VAN ANTWERP,
A. G. F. A.

APPENDIX F.

TARIFF OF VARIOUS COUNTRIES.

PREPARED BY WINFIELD SCOTT.

TARIFF OF VARIOUS COUNTRIES.

San Francisco, September 1, 1894.

The following is a table showing the import duties of various countries on viticultural products, prepared for the guidance of the export trade, with the assistance of the Consuls-General or Consuls at San Francisco, to whom due acknowledgment is due.

WINFIELD SCOTT,
Secretary.

ENGLAND AND HER COLONIES.

ENGLAND.

Wine, in casks or bottles, not over 30° proof	1 shilling per gallon.
Wine, in casks or bottles, between 30° and 42° proof	2 shillings 6 pence per gallon.
Wine, sparkling, under 30° proof	1 shilling per gallon.
Wine, sparkling, between 30° and 42° proof	2 shillings 6 pence per gallon.
All wines over 42° proof	3 pence additional for each degree.
If sparkling, and in bottles, if not worth over 15 shillings	1 shilling per gallon additional.
If over 15 shillings	2 shillings 6 pence per gallon additional.
Spirits	10 shillings 10 pence per proof gallon.
Spirits, not tested, as in cordials	14 shillings 8 pence per gallon.
Spirits, if bottled and in bond	3 pence per dozen.
Perfumed spirits	17 shillings 3 pence per gallon.
Raisins, figs, fig cake, apricots, plums, prunes	7 shillings per hundredweight.

Note.—Grape brandy from countries other than France cannot be entered as cognac.

CANADA.

Wine, up to 26 per cent alcohol	25 cents per gallon and 30 per cent ad valorem.
Wine, each degree between 26 and 40 per cent	3 cents per gallon.
Wine, sparkling	$3 per dozen and 30 per cent ad valorem.
Brandy	$2 12 per imperial gallon.

NEWFOUNDLAND.

Claret	51 cents per gallon.
Spanish reds and Italian	35 cents per gallon.
Malaga	35 cents per gallon.
Port and Madeira	$1 65 per gallon.
Hock and Burgundy	$1 per gallon.
Champagne	$3 40 per gallon.
All other	15 per cent and 90 cents per gallon.
Brandy	15 per cent and $2 40 per gallon.

QUEENSLAND.

Wine, sparkling	10 shillings per gallon.
Wine, all other	6 shillings per gallon.
Brandy	14 shillings per gallon.
Brandy coloring, having over 35 per cent alcohol	12 shillings per gallon.
Raisins	2 pence per pound.

TASMANIA.

Wine, sparkling	10 shillings per gallon.
Wine, all other, in wood	6 shillings per gallon.
Wine, all other, in bottles	8 shillings per gallon.
Brandy	15 shillings per gallon.
Brandy coloring, over 35 per cent alcohol	15 shillings per gallon.

NEW ZEALAND.

Wine, sparkling........................9 shillings per gallon.
Wine, all other, except Australian, containing less than 40 per cent proof spirits........................6 shillings per gallon.
Wine, Australian, containing not more than 35 per cent proof spirits........................5 shillings per gallon.
Spirits in bottles, jars, etc........................16 shillings per gallon.
Spirits in bulk, jars, etc........................15 shillings per gallon.
Raisins and dried fruit........................2 pence per pound.

NOTE.—There is a discrimination of 1 shilling per gallon in favor of Australian wine.

NEW SOUTH WALES.

Wine, sparkling........................10 shillings per gallon.
Wine, all other........................5 shillings per gallon.
Brandy........................14 shillings per gallon.
Brandy coloring, containing over 35 per cent alcohol........................14 shillings per gallon.
Raisins........................2 pence per pound.

VICTORIA.

Wine, sparkling........................45 per cent ad valorem.
Wine, all other........................12 shillings per gallon.
Brandy........................15 shillings per gallon.
Brandy coloring, containing over 35 per cent alcohol........................15 shillings per gallon.
Raisins........................3 pence per pound.

SOUTH AUSTRALIA.

Wine, sparkling........................10 shillings per gallon.
Wine, all other, up to 35 per cent proof........................6 shillings per gallon.
Brandy........................14 shillings per gallon.
Brandy coloring, containing over 35 per cent alcohol........................14 shillings per gallon.
Raisins........................2 pence per pound.

CEYLON.

Claret, bottled........................1 rupee and 25 cents per gallon.
Claret, bulk........................50 cents per gallon.
Sparkling wines........................50 cents per gallon.
All other wines, bottled........................1 rupee and 50 cents per gallon.
All other wines, bulk........................1 rupee per gallon.
Spirits........................4 rupees per proof gallon, and 50 cents for every 10° over proof.

FIJI ISLANDS.

Claret and Australian wines, bottle or bulk........................2 shillings per gallon.
All other still wines........................4 shillings per gallon.
Sparkling wines........................6 shillings per gallon.
All spirits........................14 shillings per gallon.

NEW GUINEA.

Spirits........................12 shillings per gallon.
Sparkling wines........................6 shillings per gallon.
Other wines........................4 shillings per gallon.

JAMAICA.

All wines........................2 shillings 6 pence per gallon.
All spirits........................10 shillings per gallon.

TRINIDAD.

Wines, sparkling........................6 shillings per gallon.
Wines, all other, bottled, under 35 per cent alcohol........................2 shillings 6 pence per gallon.
For each degree over 35 per cent........................3 pence.
Wines, all other, in wood, up to 22 per cent........................8 pence per gallon.
Wines, all other, in wood, up to 32 per cent........................1 shilling per gallon.
Wines, all other, in wood, up to 42 per cent........................2 shillings 6 pence per gallon.
For each degree above 42 per cent........................3 pence.
Brandy........................10 shillings per gallon.

BERMUDA.

Wine........................20 per cent ad valorem.
Alcohol and all distilled liquors........................4 shillings per gallon.

BRITISH GUIANA.

Wine, not over 26 per cent proof and not over $2 per gallon........................50 cents per gallon.
Wine, bottled........................$1 per dozen quarts.
Wine, all other........................80 cents per gallon.
All spirituous liquors........................$2 50 per proof gallon.

CAPE COLONY.

Wine........................6 pence per imperial gallon.

OTHER COUNTRIES.

FRANCE.

Distilled liquors	Alcoholic liquors	Brandies	In bottle	80 francs per 100 litres of liquid.
			Otherwise	80 francs per 100 litres of pure alcohol.
		Others		80 francs per 100 litres of pure alcohol.
	Liquors			90 francs per 100 litres of alcohol.

Fermented liquors (wine exclusively made from fermented fresh grapes)	Up to 11°; namely, up to 10.9° inclusive	1 franc 20 centimes (1) per degree alcohol, and (2) per 100 litres of liquid.
	From 11°, included	1 franc 20 centimes (1) per degree alcohol, and (2) per 100 litres liquid for first 10 degrees; (3) for each degree above 10, a tax equal to the amount of the excise duty on the alcohol.

Note: These duties are applied when the goods are imported direct into France from a country not in Europe; if imported through European ports, 3 francs 60 centimes per 100 kilogrammes, gross, is to be added.

GERMANY.

Wine, in casks, leather bottles, or jugs of at least 50 kilogrammes gross weight ..... 24 marks per 100 kilogrammes.
Wine, in small bottles or small leather bottles or jugs ..If sparkling, 80 marks per 100 kilogrammes; if still, 48 marks per 100 kilogrammes.
Fruit wines and cider not included.
Dried grapes ..... 24 marks per 100 kilogrammes.
Fermented grapes ..... Same as wine.
Fruit brandies ..... 180 marks per 100 kilogrammes.
Wash and singlings ..... Free.

GERMANY, WITH COUNTRIES IN ZOLLVEREIN.

Red wine and must in casks for blending purposes ..... 10 marks per 100 kilogrammes.
Other wines ..... 20 marks per 100 kilogrammes.
Wine for distilling ..... 10 marks per 100 kilogrammes.

ITALY.

Wine in casks ..... 18 francs per hectolitre.
Wine in bottles ..... 58 francs per 100 bottles holding not over 1 litre.

RUSSIA.

Arrack, rum, brandy (French), and prune brandy in casks ..... 12 rubles per pud, brutto.
Grain spirits in bottles, liquors, kirchwasser, gin, whisky, and all spirits flavored with various fruits, also arrack, rum, French brandy, and prune brandy .. 1 ruble per bottle.
Wine of grapes—
All imported in wood ..... 4 rubles per pud, brutto.
Not mousseux ..... 45 copecs per bottle.
All kinds mousseux ..... 1 ruble 40 copecs per bottle.
Raisins ..... 1 ruble 80 copecs per pud.

Remarks.—If wines are above 16° alcohol they are subject to additional duty of 12 copecs per degree above 16°.
One pud is equivalent to 32 pounds.
All duties payable in gold.

SPAIN.

Wine, sparkling ..... 150 pesetas per hectolitre.
Wine, all other ..... 50 pesetas per hectolitre.
Brandy ..... 20 pesetas per hectolitre.
Other distilled liquors ..... 1 peseta per litre.
All preserved and dried fruits ..... 1 peseta per kilogramme.

DENMARK.

Wine and fruit juice, unfortified, in bottles .... 13.44 cents per pot.*
Same in barrels .... 2.73 cents per pound.
Grape wine, in casks .... 22 per cent ad valorem.
Grape wine, in stone jars .... 45 per cent ad valorem.
Liquors which cannot be graded .... 13.44 cents per pot.
Same, 8° strength or under .... 50.4 cents per eight pots.
Same, for each ¼ degree over 8° .... 1 cent per eight pots.

*4.7 pots equal 1 gallon.

SWEDEN.

Wines, all kinds, not exceeding 21 per cent of alcohol .... 15 ore per litre.
Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in casks) .... 30 ore per kilogramme.
Wines, all kinds, between 21 per cent and 25 per cent of alcohol (in other packages) .... 65 ore per litre.
Wines, all kinds, over 25 per cent of alcohol .... 1 krone 50 ore per litre.
Brandy and spirits in casks and made from grapes in any other country than France .... 75 ore per litre of 50 per cent alcohol at 15° C.
Same in other packages (regardless of the percentage of alcohol) .... 1 krone 11 ore per kilogramme.
Raisins .... 14 ore per kilogramme.
No allowance for tare.

NORWAY.

Wines, not exceeding 21 per cent alcohol, in casks (16 per cent for tare) .... 11½ ore per kilogramme.
Wines, not exceeding 21 per cent alcohol, in bottles .... 11½ ore per litre.
Wines, between 21 per cent and 25 per cent alcohol, in casks (16 per cent for tare) .... 36 ore per kilogramme.
Wines, between 21 per cent and 25 per cent alcohol, in bottles .... 36 ore per litre.
Wines, over 25 per cent alcohol .... Same as brandy 100 proof.
Brandy, in bottles .... 1 krone 90 ore per litre.
Brandy, in other packages, 100 proof (16 per cent tare for casks) .... 2 krone 3 ore per litre.
Raisins (20 per cent tare on cases) .... 12 ore per kilogramme.

BELGIUM.

Alcoholic liquors (distilled) used as beverage, up to 50° strength; Gay Lussac at 15° C., in casks .... 100 francs per hectolitre.
Same, each degree in excess of 50° .... 2 francs per hectolitre.
Same, in bottles, regardless of strength .... 200 francs per hectolitre.
Wines (subject to Internal Revenue tax of 23 francs per hectolitre) .... Free.
Wines, over 18 per cent alcohol .... Excess at the rate for alcoholic liquors.
Raisins .... 25 francs per 100 kilogrammes.

SWITZERLAND.

Dried raisins for wine making .... 20 francs per 100 kilogrammes.
(N. B.—Dried raisins for wine making pay, besides the duties, an internal tax, to be fixed later.)

Juice from fruit or berries, evaporated fruit juice, without sugar, with or without alcohol .... 20 francs per 100 kilogrammes.
(N. B.—Subject also to an internal tax, to be fixed later.)

Wine in casks—natural .... 3.50 francs per 100 kilogrammes.
Wine in casks—artificial .... 12 francs per 100 kilogrammes.
Wine in bottles—natural .... 25 francs per 100 kilogrammes.
Wine in bottles—artificial .... 50 francs per 100 kilogrammes.
(N. B.—Artificial wines pay double the duty of natural wines. The natural wines containing over 15° of alcohol, and the artificial wines containing over 12° of alcohol, pay for each degree above an internal tax of 80 centimes and a supplemental duty of 20 centimes per 100 kilogrammes. Natural wines are considered the products of the fermentation of fresh grapes, without any other admixture.)

Sparkling wines, in bottles .... 40 francs per 100 kilogrammes.
Spirits of wine and alcohol, in casks, per centesimal degree of pure alcohol measured with the alcoholometer of Tralles .... 20 francs per degree and per 100 kilogrammes.
Brandy and other alcoholic drinks, such as cognac, rum, arrack, etc., which are not liquors in the ordinary sense, that is, which contain neither aromatics nor sugar:
In casks, per degree of pure alcohol measured with the alcoholometer of Tralles .... 20 francs per degree and per 100 kilogrammes.
In bottles or jars, without regard to alcoholic measures .... 30 francs per 100 kilogrammes.

TURKEY.

Wines and brandies	8 per cent ad valorem.

HAWAII.

Alcohol and other spirits of the strength of alcohol, per gallon	$10 00
Provided that security be given that the same is intended for medicinal, mechanical, or scientific purposes, upon application, in due form, to special licensees, per gallon of 90 per cent proof	7 50
All exceeding 90 per cent proof shall pay duty according to its strength. (Laws of 1893.)	
Mythelated spirits, to persons holding licenses, per gallon	1 00
Ale, beer, cider, porter, and all fermented drinks not otherwise provided for:	
Per dozen reputed quarts	40
Per dozen reputed pints	20
Per gallon if in bulk	15
Brandy, gin, whisky, and all other spirits or strong water of whatever name or description, and all liqueurs, cordials, bitters, brandied fruits, perfumery, and all other articles of merchandise, sweetened or mixed, containing alcohol or spirits of the strength of 30 per cent or upwards, and not exceeding 50 per cent proof, per gallon	3 50
All exceeding 50 per cent shall pay alcoholic duty in proportion to its strength, per degree	10
Wines, cordials, and bitters above 21 per cent of alcoholic strength, and all other articles containing alcohol or preserved in alcohol or spirits above that strength and below 30 per cent, unless otherwise provided for, per gallon	2 00
Sparkling Moselle and Sparkling Hock—	
Per dozen reputed quarts	4 00
Per dozen reputed pints	2 00
Champagne—	
Per dozen reputed quarts	6 00
Per dozen reputed pints	3 00
Claret, Rhine wine, and other light wines under 21 per cent of alcoholic strength and not otherwise provided for—	
Per dozen reputed quarts	40
Per dozen reputed pints	20
Per gallon if in bulk	15

MEXICO.

Wine, red or white, in glass, no allowance for leakage or breakage	20 cents per kilogramme (net weight).
Same in wood	10 cents per kilogramme (net weight).
All other spirituous liquors under same conditions	35 cents per kilogramme (net weight).
Raisins	10 cents per kilogramme (net weight).

SALVADOR.

Red wines	5 cents per kilogramme.
White wines (including champagne)	10 cents per kilogramme.
Brandies	60 cents per kilogramme.
Raisins	20 cents per kilogramme.
Liquors	60 cents per kilogramme.

NICARAGUA.

Sweet liquors	$0.037 per pound.
Wines of all kind in any style of package	.022 per pound.
Wines sparkling, such as champagnes, etc.	.044 per pound.
Spirits 12° to 25° Carthier	.294 per pound.
Spirits above 25° Carthier, by special permit of Government	.022 per pound.

COSTA RICA.

Red or white wines in bottles	3 cents per kilogramme (gross).
Red or white wines in bulk	5 cents per kilogramme (gross).
Fortified wines in bottles	9 cents per kilogramme (gross).
Fortified wines in bulk	13 cents per kilogramme (gross).
Liquors (whose introduction is allowed in barrels)	80 cents per kilogramme (gross).
Liquors (introduced in other packages)	60 cents per kilogramme (gross).
Cognac and all brandies (in barrels or demijohns)	80 cents per kilogramme (gross).
Cognac and all brandies (in other packages)	60 cents per kilogramme (gross).
All dried fruits, including raisins	13 cents per kilogramme (gross).

GUATEMALA.

Red wines for table, in wooden packages .... 12 cents per liter.
Red wines for table, in other packages .... 15 cents per liter.
Generous wines, as Sherry, Muscatel, Malvasia, Malaga, Port, Pedro Ximenez, and others, in whatever packages .... 40 cents per liter.
White wines, any kind, in whatever packages .... 40 cents per liter.
Spumy wines, as champagne and others of the same quality, in whatever packages .... 50 cents per liter.
Vermouth wine, in whatever packages .... 50 cents per liter.
Whisky, in whatever packages, up to 20° Beaumé .... 85 cents per liter.

COLOMBIA.

Claret, in barrels or demijohns .... 2½ cents per kilogramme.
White wine, in barrels or demijohns .... 5 cents per kilogramme.
All other wine .... 40 cents per kilogramme.
Brandy and distilled liquors .... 40 cents per kilogramme.
Raisins .... 20 cents per kilogramme.

AUSTRO-HUNGARY.

On wines in bottles or barrels .... 20 florins per 100 kilogrammes (netto).
Sparkling wines in bottles or barrels .... 50 florins per 100 kilogrammes (netto).
Brandy and liquors generally .... 76 florins per 100 kilogrammes (netto).
Raisins .... 12 florins per 100 kilogrammes (netto).

JAPAN.

Wine and brandy .... 5 per cent ad valorem.

URUGUAY.

	Value.	Duty.	
		Per cent.	Specific.
Liquors—			
And syrups, all kinds, in casks........quart	517	....	.31
In bottle, from 1 pint to 1 quart........bottle	599	....	.32
In bottles, ½ pint up to 1 pint........bottle	299	....	.115
In bottles, up to ½ pint........bottle	115	....	.0775
Wine—			
All kinds, in bottle or flask, up to 1 litre........bottle	....	....	.237
One half bottle in proportion.			
Fine, in casks or demijohns, such as Rhine, Port, Sherry, Madeira, Ajerezado, Muscatel, and Burgundy........quart	517	....	.237
Common, in general, in casks or demijohns........quart	124	....	.062

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TREATISE

ON

WINE PRODUCTION

AND

SPECIAL REPORTS ON WINE EXAMINATIONS, THE TARIFF AND INTERNAL REVENUE TAXES, AND CHEMICAL ANALYSES.

By CHAS. A. WETMORE.

APPENDIX B TO THE REPORT OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS FOR 1893-94.

SACRAMENTO:
STATE OFFICE, : : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1894.

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Office of the Board:

101 SANSOME STREET, SAN FRANCISCO.

To the Board of State Viticultural Commissioners of California:

GENTLEMEN: I have the honor to submit to your Board for publication, as desired by you, a treatise on principles governing the production of distinct types of wines in Europe and California, together with my several reports upon matters with which I have had official connection, under your instructions, viz.: concerning California wines at Chicago (Part II), the Tariff and Internal Revenue Taxes (Part III), and Chemical Analyses of California Wines (Part IV).

Your obedient servant,

CHAS. A. WETMORE.

SAN FRANCISCO, September 19, 1894.

PART I.

TREATISE CONCERNING THE PRINCIPLES GOVERNING THE PRODUCTION OF DISTINCT TYPES OF WINES IN EUROPE AND CALIFORNIA.

INCIDENTALLY TOUCHING UPON THE PRODUCTION, TREATMENT, AND IMPROVEMENT OF OUR PRODUCTS, PRESENT ACHIEVEMENTS, AND FUTURE POSSIBILITIES.

By Chas. A. Wetmore.

What I shall attempt to write on the production, treatment, and improvement of California wines will be intended mainly for our producers, who have already acquired some skill, and are familiar with ordinary methods and elementary technical terms. Incidentally, I shall have in view also the prejudices, preconceived and misconceived notions, and business interests of the established wine merchants in Eastern and foreign markets, who appear to have formed mistaken opinions of the future of our industry. I do not propose to prepare a manual for wine makers, as was first intended, because much that would be required for such a work would be unnecessary at this time. Special questions, involving principles rather than rules of local practice, seem to me most important. A practical manual is a work for the distant future, when different wine districts have settled down to the production of special types of wines, according to profitable experience.

During the last year I have been most of the time in Eastern States, and much of the time in the company with gentlemen connected with the trade in foreign wines. I have found generally that a notion—it is hardly fair to call it an opinion—prevails among the importers that there is, or should be, one distinctive type of California wines in general, and that we make some sort of mistake in not producing a particularly distinctive California wine. To them the well-known characteristics of vineyard districts of the Old World, such as Xeres, Portugal, Bordeaux, Burgundy, and the Rhine, appear to assume broad territorial significance individually, and each in importance equal to the opportunities of California. Small places in Europe occupy, in their minds, larger places than youthful California. They little appreciate the fact that the viticultural area, both in latitude and longitude, and in variety of climatic and soil conditions, of all the regions where grapes are grown successfully in Spain, Portugal, France, and Germany are equally matched in extent and variety on the Pacific Coast. One might as well speak of the one typical wine of all those countries of Europe as to think of one wine representative of this coast.

Few realize that the western coast of North America is practically the counterpart of the western coast of Europe, with Great Britain

attached to the continent. Every condition of soil and climate is here reproduced to compare with Xeres, Malaga, the Mediterranean coast of France, the slopes of the Alps, the valleys of the Rhine and the Rhone, and the humid climates on either side of the British Channel. In the variations of practical possibilities in viticulture, every distinction known to the west of Europe from Gibraltar and Nice to Scotland and the Netherlands, is found on this coast from Lower California to British Columbia. Our Algiers is inland in Sonora and Arizona, and our Russian Siberia between the Rocky Mountains and the Sierra Nevada. To the average New York mind, however, both Los Angeles and Shasta appear to be suburbs of San Francisco, and as nearly related as Xeres and Malaga, or as the Medoc and Sauterne districts, while they are as far apart as Xeres and Burgundy.

To those who do not comprehend this coast, let me say that every known viticultural condition of Europe that has been observed from the Rhine to the Mediterranean, and even across on the northern borders of Africa and eastward to Palestine, can be found here in the territory from the Columbia River to the Gulf of California and eastward into Arizona. Every known variety of European wine grapes finds somewhere here its natural home and somewhere the place where it cannot be successfully cultivated. In some places none, in others few, and in others many, just as in Europe, are found to prosper. Many mistakes in attempts to transplant and adapt have been made, and equally many in experimentation with European methods ill suited to locality. Our experiences and present conditions are similar to what might have been expected if, during a single generation, an enterprising people had found Western Europe unpopulated and had attempted, with one common purpose, to establish viticulture from the Mediterranean to the Rhine from one common nursery of all vines and without such knowledge of the local peculiarities as has been in fact the growth of generations. Under such a possibility we might have had Spaniards cultivating the Palomino in the Medoc, Frenchmen trying the Medocs in Xeres, Germans essaying the Riesling in Languedoc, and Portuguese worshipping Port on the Rhine, with numerous admixtures of all kinds of effort in all places. The present condition of California viticulture is not much different from such a supposed condition in Europe, with the exception that our producers are far more intelligent and better informed as to their mistakes and the means of remedying them than European vintners generally are as to the causes of any of their present successes. I shall show, however, that progress and improvement in given lines of perfection are not entirely subject to the will of producers, even if natural conditions and knowledge are present. The producer who exports is governed by the will of distant markets, and California, so far as even the Atlantic States are concerned, is yet an exporter, aided only by a very limited local consumption. Even France produces one kind of claret for England and another for the Argentines; one kind of champagne for Russia and another for America; one kind of Burgundy for foreigners and another for Paris, and everywhere in her own territory is satisfied with her local wines of every kind and character, without recourse to foreign delicacies.

Whenever foreigners, and I include New Yorkers among the most foreign people we have to deal with, will become satisfied with the best that each of our districts can produce without any attempt to imitate European styles, it will be time for them to complain if we do not pro-

duce typical California wines; but so long as the markets demand styles like favorite European brands, so long must the California producers and dealers make attempts to please them, either with ignorantly devised methods and blends, or false labels; and so long as our Eastern Atlantic Coast markets refuse to pay as much for equal quality, whether domestic or imported, they cannot expect producers to sacrifice quantity for quality in wine making to any practical extent.

Distinctive Types of European Vintages.—For the better information of our distant markets and as a partial help to the discussion of questions of local interest, I will roughly outline some of the distinctive characteristics of celebrated European wine districts and the causes which have led to local types.

There is a broad general distinction between the wines of local consumption in wine countries, and the wines of those same countries as popularly known to the markets which import them. In all wine-producing regions, the people are satisfied with their own products and have little taste for foreign brands. In all rich commercial communities, however, where imported wines are used by people of refined taste, demands are made in accordance with education, habit, fancy, fashion, and peculiar national predilection for special types of many countries and uniform styles, which are in most cases more properly described as manufactured than as grown. The merchant intervenes to satisfy the fastidious foreigner, treating the natural products of thousands of wine makers as raw material. A few celebrated vintages, destined for the use of a cultured few, escape the commercial manipulator; but these few cut a small figure in the wine trade, notwithstanding popular notions to the contrary. The taste of foreign markets has gradually reacted through the merchants upon certain wine-producing districts, until styles suited to such trade have been more or less perfected and enlarged according to the demand. These ultimate products have been the growth of generations of experience, and have varied and are still varying according to the changing tastes and habits of different generations. In our own time, types are fast losing the distinctions of vineyards and vintages in such markets as those of Great Britain and the United States; yet there are general characteristics underlying them which were originally found and appreciated in the districts to which they are credited. The most prominent among such are sherries, ports, sauternes, burgundies, and hocks. Clarets, to a limited number of English consumers, have preserved their original naturalness and variability, according to vintage; but to the greater number, and especially in this country, they must be classified according to commercial methods. The pretenses of vintages and vineyard origin are generally fictions, made honorable by long custom.

The California wine maker must of necessity make wines to sell in markets which have been educated to a limited number of commercial types, with only a small demand from the unconventional connoisseur; or he must be content with the demand for the cheapest ordinary beverages to satisfy those who either have no discriminating taste or have not the means to gratify it. For the latter we have already succeeded, but success has brought neither honor nor profit. Cheap wines are too cheap to encourage the original producer to give the necessary care to their birth, or to permit the wholesale merchant to employ sufficient

skill and time to their proper selection and development. The wine consumers of the United States who have little or no discriminating taste, and the retailers who are influenced more by cheapness than quality, are so numerous in comparison with those who suffer a critical palate to rule their pockets, that commerce has paid little attention to developing our possibilities in the lines of greater skill and reputation. To improve our revenues in the lines of cheap trade, we have only to cheapen our methods of production, transportation, and distribution. These latter problems do not lead us very deeply into the study of types and delicacy of taste, but will be touched upon later on under the head of ordinary wines. They involve only the simplest features of general commercial characteristics, which naturally follow a consideration of their highest economical development.

Except in recent times there were no vine-growing regions cultivated specially to satisfy demands of foreign or comparatively distant markets. The vine was cherished only with the same regard by the peasant as other plants were in other places: for the purpose of gratifying a universal natural demand for a stimulating beverage or narcotic. Each people, in the most simple and available manner, produced something as a substitute for water to add nervous enjoyment to the gratification of the natural appetite. The rich and the epicures did not invent the luxuries of the table; they borrowed their tastes from the poor, selecting their best and avoiding their hard necessities. The tea of commerce is but a selection out of the poor man's tea of herbs; so with wine, so with beer and other drinks.

There is much evidence to show that the special characteristics of certain celebrated wine districts, such as the Medoc, Burgundy, and the Rhine, are due to the special qualities of wild vines originally utilized by the common people for their domestic uses. In such cases the wild vines, by careful selection, were improved and satisfied the local wants. Trials were no doubt made in later times with vines of other places and countries, but as experience now shows, they were generally impractical because the climatic conditions prevented success. The Riesling of the Rhine, the Pinot of Burgundy, and the Cabernet of the Medoc, were not as prolific nor as easily trained as the vines known to warmer and drier latitudes, but they were the only varieties, then as now, that could be successfully ripened in association with a few others of local or distant origin. These limitations saved the culture of certain vines with special characteristics from neglect or extinction, and caused those regions, where the least number of varieties can be successfully grown, to produce the most distinctive types of wines. The further limitations of climate, making it impossible to destroy certain qualities of the fruit by over-development of saccharine through too early ripening, established natural local perfections, which art can only hope to achieve under other conditions. Furthermore, as will be further explained later on, climatic conditions, with little aid of art, favored naturally the development of the excellencies of these wines during their subsequent care. It was not sufficient to have the vines of the Medoc, Burgundy, and the Rhine in localities where nature prevented their perverted development, for if their wines had been transported, immediately after their first fermentation, to the ordinary cellars of the Mediterranean coast or the south of Spain, their qualities as now known would never have been realized.

In more southern latitudes, where less humidity of the atmosphere is associated with warmer temperature, the range of varieties of vines increases, modified only by soil conditions. In all such countries, except in recent times, and since commerce has stimulated experimentation to produce special types in imitation of favored places, the rule of the peasant has been to cultivate only those varieties which experience has taught him will fully ripen the largest crops. Quality, as known to the connoisseur, has been and still is of little consequence to the cultivator when opposed to quantity and acceptability for ordinary trade. In a few cases only have producers attempted to change their types to suit the trade through a sacrifice of quantity and an increase of labor. This has been notably done to some extent in Italy, especially at Asti, and in Spain at Rioja; the exceptions prove not only the rule but also that little else than the limitations of nature and the desire for the largest practical quantity of fruit have ruled the cultivator. Wine makers and merchants, by improved methods, have effected important modifications and imitations, but little of the great results is due to the ingenuity of the planter in the Old World.

It may be stated, as a rule, that wherever the fewest varieties of vines can be successfully grown, there the most distinct types are recognized by the world. In a few cases types peculiar to localities have been developed to perfection as the result more of peculiar methods of treatment of wines, and selections of vines suitable to the same, but even then a certain climatic condition favorable to the least effort and expense was the originating influence.

Again, as a general rule, it may be stated that the more favorable a region is to the culture of the greatest number of vine varieties, the less distinction has it for any distinctive excellence of type, other than that caused by simple climatic influence over the development of the fermentation under treatment suited to the most careless supervision and control.

Notwithstanding these general facts of experience, it is well known that any distinctive type in any country would be changed by a change in either the varieties of grapes grown, or of the methods of vinification, or the climatic conditions under which the wines are suffered to develop. It is therefore evident that to suppose that any region or country must or should produce some peculiar type of its own without regard to the convenience of the grower, the ambition of the wine maker, or the demand of the merchant, is absurd. It is equally absurd to suppose that in regions where great numbers of varieties of vines can be grown, that art in vinification and the control and modification of climatic influences in cellar treatment may not succeed in producing many different successful types, or that the intelligent wine maker may not with propriety attempt to approximate, rival, or excel the special foreign types which are favored by trade. Because special European types have been the results of natural limitations, or of accidental good results from careless methods where nature favors the careless, or of skill in treatment, is no good reason why such results should be patented to locality, with prejudice against infringement. If certain wines have won favor and are in demand, it has been, and still is, our highest ambition to equal them in every possible respect through careful study of all the conditions of their production, rather than to blindly plant and ignorantly ferment and treat, trusting to nature and accident to

lead us into some original path of our own. Such accidents and coincidences of climate, soil, and blind opportunity will happen without our seeking. To invent types for ordinary consumers, who do not assert their tastes, is very practicable but offers very little present profit.

I do not believe that it is necessary to dwell much upon the controlling influence over the characteristics of most wines, which is exerted by the particular variety of grape grown. To the uninitiated, it is sufficient to state that from each of a hundred different varieties of vines grown on the same soil, under the same climate, a different quality of wine will result from one simple method of fermentation, which distinctive quality can generally be preserved, for a greater or less period, by skillful cellar management.

The influence of climatic conditions over wines after the first fermentation is less generally understood, notwithstanding certain vague appreciation of the dangers and benefits of long voyages and the importance of temperature in cellars. In the sense of certain broad, general characteristics common to several distinct types, developed under practically similar climatic and cellar conditions, there are certain typical qualities common to wines of nearly all kinds in certain countries, such as the fresh, fruity taste and bouquet of the wines of Bordeaux, Burgundy, Champagne, and the Rhine; and the general presence of *rancio*, with loss of bouquet, the conversion of reddish into brownish tints, and general headiness, common in the old red wines of Spain. It is in these respects, however, that I shall try to show that, while natural conditions are favorable to the preservation of fine qualities in the former cases and unfavorable in the latter, it is in the power of the wine maker and merchant to control by art, in many respects, what nature without art denies.

Although the greater portion of the wine-growing regions of California resemble in climate and soil the greater part of Spain, Portugal, and the Mediterranean coast of France, it is not true that we must be content to produce and mature wines like those of Spain. Spain might do much better than she does; so may we. We have, however, districts resembling those of France and Germany awaiting the encouragement of trade.

Clarets, or Medoc Wines.—On the western coast of France, the northern viticultural limit is the region of Bordeaux. Farther north the cool dampness from the ocean prevents the practical ripening of wine grapes; those which are cultivated produce thin, sour beverages which will not keep well and are familiarly called *tord-boyaux*, or colicky—that is, where not destined for distillation. We find similar experience in California, except that while we are driven back from the sea coast, our viticultural zone extends farther north behind the shelter of the coast mountains. At Bordeaux, however, there is this difference: to the humidity of ocean fogs are added also frequent light summer rains. The Medoc claret district is between Bordeaux and the sea coast, sheltered only by low banks of sand dunes. In such a situation there are few varieties of vines that will flourish; we may assume that experience has proved that only the few varieties which have caused its renown, and which appear to have been the original wild vines of that region, can be used by the vintner. Our Zinfandel would either perish there from mildew or its fruit would rot before ripening. The leading

prolific varieties of Languedoc on the Mediterranean and of Spain, such as the Mataro, Grenache, Carignan, etc., would not mature their fruit and would probably be extinguished by fungoid diseases. The varieties of the Sauternes which flourish on higher, warmer, and drier ground just east of Bordeaux would produce in the Medoc wines only fit for distillation. So the restriction to the famous vines of the Medoc has been the means of preserving a type which, as commerce developed, became appreciated. The climate of the Medoc permits only a certain low but practically sufficient development of sugar in the grape, and causes a slow maturing of the juices, so that vintage time is retarded as late as is practicable. The good years are when the highest degrees of sugar are attained, which nature prevents from running too high; frequently there are bad years, when the wines are rough, acid, and green and of little value. The low temperatures and moist air of the late fall months and the low degree of sugar in the musts favor fermentations without excessive heat and acetic taints. Under such circumstances and conditions the simplest methods of wine making are practicable. Light wines with sufficient acidity to retain the reddish tints, and with high astringency from prolonged contact with the skins and seeds, are the natural results with the least possible skill permitted to a wine maker. The low temperatures and absence of acetic ferments favor the preservation of the essential oils, which contribute to the aroma and bouquet, and the damp, cool air prevents oxidation, which is the fatal enemy of natural fruity flavors and odors. Skill, which profitable trade has encouraged, is exercised in modern times to separate and exclude all unripe berries, so as to diminish harshness and green acid flavors, to prevent the use of crushing machines, and to exclude even the small dangers of oxidation. The wine cellars of Bordeaux are cool and damp naturally. Festoons of beautiful white mold hanging from the barrels give evidence of the humidity and the consequent lack of dangers from evaporation and oxidation. A Bordeaux rule for keeping cellars dry is misleading to a Californian, whose greatest dampness, even in an unventilated tunnel, is not equal to that of the driest Bordeaux *cave*. Under such conditions of wine making and cellarage Bordeaux clarets retain their natural freshness and develop their bouquet with very little demand for skill. Bordeaux cellar rules for fine wines are ever seeking to preserve intact the beauties which such natural conditions have made known; hence we find them cautioning against exposure to the air during racking, and inventing machines to prevent contamination of oxygen. In these they are only perfecting the types already favored by nature.

I do not mean to ignore all credit to differences of soil, but I am sure that soil analysis has never yet revealed the secrets of fine wines. Soil conditions and general geologic character under given climatic influences are vastly more important to study in connection with given varieties of vines and methods of vinification and cellar work.

The Medoc varieties of vines are appreciated highly in other countries, since it has been made known that certain qualities are entirely dependent upon the variety grown; but in all places where I know that efforts have been made to improve wines through cultivation of finer varieties, nature has been more benignant to the vine, and the fact of choice indicates warmer and drier climates, where a choice among many is permissible. Failure to produce clarets similar to those of the Medoc

has nearly always been attributed to the soils. In some cases this is no doubt true, but in many I am confident that the trouble has been in the climate, not only in its influence over the maturity of the fruit at vintage time and the fermentations, but also in its uncontrolled effects upon the wines in cellar.

All wine merchants are familiar with certain known changes that take place in wines subjected to long continued high temperature in a dry heating house. They know that certain wines, unless in glass, are fatally affected by long voyages across the equator. They know that a warm, dry, evaporating atmosphere oxidizes wine in wood, and first of all destroys bouquet, then turns mellowness into *rancio*, and the red tints brownish, the greenish yellows into ambers, and gradually increases alcoholicity and headiness.

The practical problems are: To what extent can skill be applied in the culture of the vine and the picking of fruit to insure comparatively similar grapes from one variety under different climates; to what extent may the conditions and methods of fermentation be modified by skill; to what extent may the conditions influencing the wines in cellar be modified so as to prevent undesired changes?

Man is naturally an inhabitant of the tropics; skill and art have made him more at home where nature is less hospitable. Clarets are natural to the Medoc and the Bordeaux cellars; they may be yet even more at home in other places, when the laws of their being are understood. I have only hinted at the possible causes of failures, but sufficiently to indicate that there are conditions of nature, more or less under possible human control, which art may master.

Rhenish Wines.—With the exception of matters purely local and the varieties of vines cultivated, observations concerning the wines of the Rhine may be made similar to those concerning Medoc clarets. On the Rhine, however, there is not the ocean fog to contend with, but a more inland and shorter northern season. Only early ripening varieties of hardy white grapes are successfully grown. The black grapes are of poor quality, making harsh or weak wines. Vineyards there require warm hillsides, and are best on southerly exposures. White grapes, for the best results, are permitted to hang on the stalks until after the first frosts, and artificial heat is often required in the fermenting houses. The dangers of warm, dry climates are not encountered. The poor maturity of many grapes and their deficiencies have suggested in the most practical manner methods of amelioration so as to insure drinkable and marketable products. The light, fresh, aromatic, and fragrant wines of the Rhine are the natural products of the smallest degree of skill, scarcely avoidable except through gross carelessness or stupidity. The sugar and water gallized wines are not more scientific than the currant, gooseberry, and elderberry wines of England, or the rhubarb wines of Connecticut; yet they are acceptable, and really often admirable, because they please the taste, satisfy the stomach, and are more wholesome when freely used than the heavier-bodied products of southern regions.

What nature compels and restricts may not art imitate through a study of the conditions of success? I am quite sure that wines similar to the ordinary and middle grades of the Rhine are easy to produce in many parts of California, and may be matured without loss of natural

qualities by skillful control of cellars, or transportation while young to favorable climates.

SAUTERNES.—The characteristics of Sauternes, as commercially known, or the white wines of Bordeaux from the light *graves* to the sweet *Chateau Yquems*, owe their distinctive qualities mainly to the particular varieties of grapes grown, and partly to peculiar methods of vinification. These wines require special skill in the cellars, which has been gradually developed as trade has indicated the peculiar qualities which should be most favored. Local skill of this kind requires the highest degree of the wine-maker's art, and inasmuch as wine-makers generally trust more to nature than to skill, and blame the seasons for their own faults, there are few imitators; yet there is far less in Sauternes to puzzle the investigator than in the Medoc clarets, because nature does so much and skill so little for the latter. It is easier to imitate a method than to reproduce nature.

SHERRY.—I refer, of course, to Spanish sherry. Here we have art and accident strangely combined. Very little is due to the cultivator. Here an accident of nature, influenced by local conditions, has been developed into an art to suit a certain capricious trade. The man who can fully understand and explain natural sherry, may be said to have thoroughly mastered the mysteries of wine making. No such man has ever lived, or if he has, he has left no record of his knowledge. All the important problems of successful wine making are involved in the study of sherries, with a view to grasping principles on which to base new rules for similar results elsewhere. Yet, notwithstanding the high degree of skill in sherry development, it is all founded upon a desire to perpetuate original careless and slovenly methods, some of the results of which have accidentally proved good.

Wines are usually preserved in casks or bottles, so as to exclude the air. The atmosphere, in most instances, quickly develops the acetic, or vinegar ferments, unless the wines are fortified with spirits. The careful wine maker, who wishes to preserve his products in as natural a condition as possible without the aid of spirits, stores them in dark cellars, sheltered from extremes of heat and cold, and keeps his casks filled as they evaporate, so as to prevent the air from injuring them. In cool, damp cellars this is comparatively easy; in dry, hot climates it is much more difficult, and requires much experience in cellar construction.

In Spain the climate greatly resembles that of Central and Southern California. The careless habits of the people have prevented Spanish wines from gaining much renown, excepting in the instances of sherry and fortified sweet products. The cellars are generally constructed without reference to the control of temperature and evaporation. The dry red wines lose their fruity flavors and natural colors through excessive evaporation, and oxidation, and secondary fermentations. They rapidly become tawny and affected by the taste of *rancio*. For the French markets they have recently been in demand, but, with few exceptions, only during the first six months of their life. While still retaining their youthful freshness the French know how to manipulate them. Sometimes the old *rancio* wines are used in small proportions to give the impression of age to cheap blends for foreign markets.

Being rich in body and still containing unfermented material when

young, such clarets require the greatest care to prevent loss of quality through secondary fermentations, and to insure perfect clarification and maturity for bottling without loss of fruity characteristics. The French merchants say that with the exception of the wines of Rioja, Spanish clarets can only be exported to the north during the first winter; that they cannot cross the equator. The Rioja wines are made from Medoc varieties of grapes, which were introduced by amateurs. In transportable qualities, at least, the Medoc vines reproduce their distinctive traits even in Spain.

Oxidation during the period of maturing wines is the general fault of wine cellars in warm, dry climates. Its effect, where acetic fermentation is not suffered, is one of the essential causes of unwholesome headiness. In red wines it is revealed by the *rancio* taste. For this reason there are no clarets of renown credited to Spain, although many which are useful to manipulators, and a few which enjoy a limited admiration outside their own country. Carelessness and want of intelligent study and control are followed by the same results in Spain, as in many country cellars of California, where the producer wonders why the dealers don't offer high prices for old wines. In this State, however, to a small extent, the dealers comprehend the difficulty and remove the wines from the country to the cooler, moist atmosphere of San Francisco before they are spoiled, and observe the advantage of development in cellars on the Atlantic coast. But it is seldom that the most hopeful young clarets which are kept at the vineyards improve with age. Hence the common opinion that California wines "won't keep," and that we cannot compete with the French; that we must look to a California type of our own, etc. This is a mistake; we can preserve the naturalness of wines, but to do so we require more skill than is needed in Bordeaux. If we suffer nature to work without hindrance or direction, we shall gradually drop into Spanish ruts and experience.

These remarks about effects of climate on clarets during their development may seem out of place in considering sherries; but their relevancy will soon be seen, because what proves a source of grave defects in the dry red wines is one of the elementary principles of sherry.

The original methods of the white-wine makers of Xeres must have been of the most primitive kind. The wines were stored in ordinary buildings above ground, subject to excessive ventilation, evaporating draughts, dry and warm air in summer, and the chills of winter. Habits of careful cellar management were not learned. Evaporation left vacant spaces and gave access to air. Under such careless treatment, the clarets of Bordeaux, the burgundies, and the Rhenish hocks would all be absolutely ruined and turned to vinegar. In the country about Xeres, however, portions of the wines passed through a strange and yet unexplained transformation without acetification. The vinegar ferments destroyed more or less of the vintage, but the rest took on what elsewhere would be considered an unaccountable durability, and were kept on tap for domestic use with constant improvement. All of these wines could have been preserved sound and practically valuable by careful cellar management such as is common and absolutely necessary in France and Germany.

It may be presumed that at first many industrious wine makers learned how to preserve their wines from vinegar ferments and suffered only from the peculiar defects of white wines in dry hot climates. The

originators of sherry, however, must have been very careless men, who were content with what they could save without troubling themselves. As they discovered that some of their products would remain sound and drinkable, although turbid and covered with scum, they were content with simple remedies to reduce the percentages of loss. They found that sprinkling powdered gypsum upon the grapes helped them to avoid destructive diseases and promoted speedier development; also that when a wine was going wrong the addition of spirits checked the difficulty. So it happened that by degrees they found practical ways to save a large percentage of their vintages without much trouble.

The durability of these wines made them favorites of the common trading vessel and the tavern-keeper; so they soon crossed the waters and entered into commerce. Whether it was really dry sherry as we now know it that Falstaff eulogized under the name of sack, or Canary, it is evident that something similar was then popular in the English taverns, for the same reasons that Madeira was once the favorite in old colonial times in America. The demand for a wine that would bear the rough handling of primitive commerce and that could be kept on tap was sufficient reason to stimulate those who had accidentally fallen upon the natural conditions of its production to perfect a system based originally on gross carelessness.

As the foreign trade increased, there has been a gradual development of a type with various modifications, preserving some of the characteristics of original natural sherry, but in a great measure perverted as guided by the demands of commerce. The true beauties of really natural sherry are comparatively little known even in countries which affect the highest regard for it. There is so much loss in natural sherries of the purest types, through acetic and other destructive alterations, that the vicious practices of "plastering" (use of gypsum in fermentation) and fortifying with spirits have become generally to be considered essential elements of production. These are, however, only "make-shifts" of art, encouraged by commerce, because the mystery of natural sherry has never been solved.

The scientific problem is to determine what are the natural conditions which cause one pipe of wine to develop into sherry, while another by its side, apparently the same, is converted into vinegar. Although volumes have been devoted to the *Micoderma vini* and the *Micoderma aceti*, I cannot discover that any really serious and persistent scientific investigation has been devoted to the differential laws of their development, with a view to controlling sherry production at the will of the wine maker. I believe that the problem may be solved, so that natural sherry making, without the aids of plaster and spirits, may become the result of art rather than the accident of nature. Before the relation between sugar and carbonic acid gas was understood, the champagne bottlers suffered ordinarily a loss of 40 per cent through breakage; now they are able to control the conditions so as to reduce loss to 5 per cent, which even then is the fault of the bottle maker.

Sherry, as demanded by commerce, is a type for the production of which there are abundant reasons to believe California has many places admirably suited. If we can solve the problem of natural sherry, and avoid the attendant percentage of losses in developing it, we shall have conquered a commercial necessity of great value.

Shall we be charged with a sinful desire to imitate foreign wines, if

we try to produce what the world demands? If so, then the Xeres merchants are certainly guilty, because they do not confine themselves to the small quantity of natural sherry that can be made without the aid of plaster, spirits, and grape syrups.

The burden of my song is that the underlying principles governing the production of most of the types favored by commerce, such as we need to court, must be wrested from nature. So far as art is concerned there is little that we cannot easily learn, or invent, for the best results have been the least indebted to either science or art. The skilled foreign wine maker generally cuts a sorry figure in our wine making, and knows less of principles than our neophytes. He too often fancies that what was due to nature in his own country should be credited to his "rule of thumb," and so he fails to adapt himself to new conditions.

Port Wine.—When we refer to the port wines of Portugal, as most appreciated in England, we find a great confusion in popular ideas in this country. In this department of the wine trade, commerce has seized upon a natural type as a hint only of a popular demand. Commercial ports so far exceed in relative trade importance the original natural port wine, that it is difficult to tell whether a study of the original is worth as much as obedience to trade demands. It is certain, however, that we must give more study to natural Portuguese port if we wish to please the better class of English consumers.

Original port wine, such as has been cherished in memory by English gentlemen for generations, was quite as natural a product of rude simplicity in wine making as original types of natural dry sherry. On the hot mountain slopes of the Douro, grapes of many varieties were cultivated, yielding in that climate fruit very rich in sugar. Such are the simplest conditions found in many parts of California. The simple peasants of Portugal invented the rudest appliances for wine making. Their fermentations were conducted in shallow stone vats, which permitted the treading of the grapes to assist the fermentation, so that the greatest possible conversion into alcohol might be accomplished. The wine so derived had a high alcoholic strength, a heavy body, and generally more or less sweetness, due to the excess of saccharine in the grapes. Wines of such character pleased them, so they did not concern themselves with efforts to approximate the claret types by picking their crops before they had attained excessive maturity. They did what has generally been done elsewhere, viz.: submitted to nature, with little thought of controlling its conditions by inventive watchfulness and forethought. They soon discovered that such wines were often subject to alterations and disease, on account of the excess of fermentative material, and applied the usual simple remedy of fortification. They, however, aimed always to get as complete a fermentation as possible, and so produced a natural wine, needing only comparatively small additions of spirit for preservation. Here their problem was different from that of the claret makers of the Medoc, who were not troubled with excessive sugar, and only needed to guard against vinegar by exclusion of air.

These wines, when fortified, possessed the qualities favorable to easy and safe transportation and durability while on tap. Hence they became favorites of the merchant sailors, and the taverns, as well as of the country gentlemen, who would be puzzled to learn how to preserve clarets. For the same reasons sweet fortified wines are still the favor-

ites of trade in all small towns and sparsely settled countries where the skilled wine merchant is not a near neighbor. Their sweetness is a positive recommendation to many; their strength to many more; but originally taste was for a sweetness scarcely more than simple mellowness. "Dry port" is not uncommon, although technically none is absolutely free from some mellowness. The characteristic flavor was that of the over-ripe but not dried grape. Such wines were shipped while young to England and there suffered to mature in a moist and relatively cool atmosphere. When we read of the crust in the old bottled port, we may well know that it was customary to bottle such wine long before it was matured for drinking. The conditions under which port wine was matured in the English climate did not favor oxidation and the development of *rancio.* The fruity flavor was preserved during the slow process of defecation. Ports developed and matured under such circumstances must necessarily have more delicate flavors than those rapidly aged in warm, dry climates. This circumstance, preserving natural fruitiness, together with the fact of complete fermentation of very ripe grapes before fortifying, is, I think, the true explanation of the difference which Englishmen find between port wine, such as they like, and the sweet red wines which American commerce seems to prefer. There are many places where the Portuguese method might be adopted in California, but we would have the same trouble in maturing as we have with clarets. Hot, dry air in the cellar and failure to keep casks full necessarily destroy natural fruit flavors and cause the so-called Madeira taste, which is nothing more than the *rancio* of sweet wine. This can be demonstrated easily by blending a baked sherry with a new fresh port, as is often done by the trade to produce the flavor of old California port.

That we can approximate successfully the Portuguese natural ports by changing methods of fermentation and cellar management I am quite confident, but it is doubtful whether our merchants would encourage us in doing so.

Even in Portugal, however, natural port wine has been largely superseded by the commercial types. Sweetness is very generally added by means of boiled musts, or increased, as in the south of France, by checking fermentation with spirits.

MADEIRA WINE.—This is a sort of relation by marriage, rather than of blood, to Spanish sherry, educated in a hot-house. True, natural sherry owes its general characteristic type to unaided natural conditions of climate and exposure to the atmosphere, coupled with some undiscovered condition of the new wines. There are distinctions of quality and style directly traceable to certain varieties of grapes. Madeiras seem to owe their original departures from the sherry types to differences in the varieties of grapes. Their development, however, is one of art, and not of nature. They are fortified with spirit and subjected to high temperatures in heating-houses, after the manner of "baking" practiced with the imitation sherries of the south of France and California. Here art stepped in to protect the producer against the losses sustained through careless storage in a hot climate. The flavors derived from certain grapes are recognized in Madeira, and it is not pretended that even under treatments which are the most destructive of natural fruit flavors and bouquets, the different varieties of grapes grown on the same soil lose their identi-

ties, even though they are not indigenous. It is claimed that the principal Madeira grapes came from the eastern Mediterranean shores and islands. A certain resemblance to Spanish sherry is sometimes obtained in Madeira, when desired, by the use of the *Palomino*, one of the distinctive Spanish sherry grapes.

The methods of treatment have been specially devised to suit foreign trade and to protect products during voyages in warm latitudes. With proper selection of varieties, grown under similar conditions in California, and similar methods of vinification and treatment, there should be no difficulty in reproducing these types in California. A peculiar acid often found in some old Madeiras, highly appreciated, is plainly the result of a lactic fermentation, and in some cases I find it to be the same as that found in some of our wines which were imperfectly fermented, and afterwards suffered to undergo secondary fermentation and oxidation. The finest types, however, show that the new wines before treatment were sound, and perfectly dry. I have seen a *Trousseau* port in California go into a secondary fermentation, become diseased, and afterwards develop in a warm, dry cellar into a very superior type of sweetish Madeira with a slight lactic acid taste. The wine I refer to was selected by a connoisseur and purchased at a high price on account of this resemblance. At a recent banquet given by the most experienced wine importers of New York, a Madeira forty years old was shown and praised. It had a positive lactic acid taste. I should have been inclined to condemn it for this defect, but was quite willing to learn what connoisseurs affected to admire. Perhaps if we should fortify some of our condemned sweetish-sour red wines, and keep them in a "baking" house until the red colors and tannin are deposited, we might please some people, who have a taste that way. Wine makers must often please the trade rather than themselves. What we often condemn the trade finds good use for. A good way to test the Madeira qualities of wines is to put samples in glass bottles and subject them for several weeks or months to warm sunlight, taking care not to fill the bottles quite full and to fortify with choice, clean spirits.

Sweetening Madeiras and sherries is a special art, and is a subject to be discussed separately. The best natural products are absolutely dry; afterwards sweetened to suit the fancy of trade.

Burgundies.—There is nothing essentially different in the production of Burgundies as distinguished from clarets, except in the different varieties of grapes cultivated and certain modifications of fermentation methods made necessary by excess of fermentative matter in the juices and properties of the skins. Cellar care to exclude the influence of the atmosphere and changes of temperature is similar to that in Bordeaux claret cellars, with still more rigid rules on account of the liability to secondary fermentations and diseases growing out of the excess of albuminous matter. The old practice of freezing Burgundies I shall have occasion to refer to later.

True Burgundies have not been popular with the trade, because of their extreme sensitiveness when transported in wood. They are not produced in southern viticultural latitudes, because the varieties of vines are very light bearers and over-ripen their fruit, making it difficult to pick them in the right conditions and more difficult to ferment them without too great development of heat.

The ordinary commercial Burgundy is generally a blend with wines of greater durability, and has almost ceased to have a distinctive or typical character. For this reason our producers have very uncertain standards to follow. Popularly we find too many who classify nearly all rich, full-bodied, strong, dry red wines as Burgundy. Commerce, in this case, has developed an uncertain standard, rather than a type.

As I am discussing commercial standards and types of original local significance, the grand beauties of true Burgundy are of comparatively small importance, more interesting to the amateur than the professional.

White Burgundies are too varied in quality to be considered a type. Ordinary Chablis of commerce is a sort of intermediary between Sauterne and Hock.

The qualities of these wines, however, are all illustrations of the important principles which I am attempting to make clear. They are local in France, because the varieties of vines, which can be successfully cultivated in the Burgundy region, are very limited, and the methods of vinification and cellar treatment are dictated, as in Bordeaux, by nature. The same vines and methods in southern climates produce very different results; and, even with skill in modifying methods, the vine grower who can raise more prolific varieties prefers to leave quality to the amateur. I find in France that quality instead of quantity is generally a virtue of necessity; in other countries almost invariably so. In spite of all the preaching to the contrary, quantity is generally prefered to quality.

Cognacs.—Too much praise cannot be given to the fine grades of cognac brandies, provided that due allowance is made for the enormous quantity of spirits of beet root and potatoes, artificially flavored, and exported as cognac. Too much credit for original artistic effort and local advantage is, however, yielded to France in this, as in other matters of viticulture. Distillation in the Charentes, of which the city of Cognac is the chief trade center, became a necessity, not a matter of choice. The wines of ordinary production have always been too light, thin, and acid for consumption or preservation, except in recent years when trade has learned how to doctor, mix, and strengthen a good portion of them. Distilleries became necessities, and with distilleries the varieties of grapes which would produce the most profitable crops. Fortunately the peasants fell upon the *Folle Blanche* grape with some of its associates, which experience, not only there but in other parts of France, proves to yield the favorite qualities in brandy. So far as distilleries are concerned, art has done little for cognac, the simplest, old-fashioned appliances and methods have been pursued, because adapted to the limited means of ordinary grape growers. The peasants discovered what grapes were capable of yielding them the largest crops and the simple means of distillation; the great merchants acquired skill in selecting and grading the new brandies, and as their markets increased, also the skill necessary to imitate the best growths and to cover natural defects of youth and flavor with artificial flavors. Underlying the cognac trade there is a certain fine quality of spirit, owing its origin to local necessities, but overlying it there is a vast superstructure, the credit of which is due to the invention and good taste of the manipulator.

There is nothing difficult in producing fine brandies in California, except to find merchants who will pay prices that will be profitable to

the grower. So long as the markets will accept cheap neutral alcohol flavored in imitation of cognac, so long must the connoisseur hunt for really fine natural brandy as for a needle in a hay stack, or as for pure olive oil in an ocean of cotton-seed product.

I have always believed that some merchant who can wait for profit would yet make a fortune by specializing on our possible fine products, which need only the demand to stimulate the supply.

Wines capable of being sold at fair prices are not distilled in France, hence fine brandy is limited to those places where the wines are limited naturally to distilling purposes. In other places the distillery is fed like swine at the slaughter yard with the offal. With the exception of the limited production of really pure cognac brandy, our California brandies are superior to any of the products of France, Spain, and Italy; they could be vastly improved if the market would offer prices equal to the increased cost of material.

CHAMPAGNES.—In the cool, northern zone of French viticulture, the *Pinot* family of grapes is found to be hardy enough to prosper, provided that it is cultivated with great care. In Burgundy regions along the lap of the Alps, it makes a great deal of good ordinary wine, and a small proportion that, with infinite care, can be nursed into really grand results. In the Champagne district, east of Paris, the climate is less favorable and the *Pinots*, with a few associates selected after long experience, barely ripen late in the season sufficiently to make wine. These grapes, however, have, as in Burgundy, the peculiar characteristic of excessive fermentable material. It was found difficult to complete the fermentations before winter, and still more difficult to control them during the revival of fermentation in the spring. Bottling the young wines and completing the fermentation in bottle was a device born of a local difficulty, as other good methods in other places are shown to have been. Champagne was born of a local climatic condition, and has been perfected as an art under the dictation of foreign trade. It has been imitated in many places, with little attempt, however, to reproduce the natural conditions of must and surroundings. The style rather than the kind has been copied.

THE WINES OF THE WORLD.—I have roughly outlined certain leading conditions under which the most important favorites of non-producing wine markets have originated. These, however important they may seem to the connoisseur, are not truly representative of the countries they come from. To classify French wines under the heads of the fine types known in London clubs would be as misleading as to classify the English people under the family titles of the nobility, or the present American people under the family groups of the early colonists.

There is only a little wine in the world, relatively, which is worth discriminating study. The wines of the world are generally as plain and common as the plain ordinary articles of food. Each country is satisfied with what its peasants produce with little skill, as it is with other food products. There are many gourmands, but few epicures, in matters of home production. As the common peasant sells his cream and butter, and consumes his skim milk and sour clabber cheese, so do communities export the choicest of their products and retain what the merchant declines. It is for this reason that California must study the exceptional

products favored by commerce, and especially because we are destined for a long time to be exporters of agricultural products. France does not need to export more than five per cent of her wines, hence she is interested mainly in ordinary wines for Frenchmen; and her exporting merchants in the problem of making a very small and diminishing percentage of exceptional quality stretch to suit an increasing foreign demand. California, however, must heed the dictates of fashion in distant lands, because we must make wine to sell, not to drink—ourselves. When we sell, we must consult the taste of others; hence, when we attempt to satisfy fixed demands, we cannot be fairly called imitators. If "big pumpkins" are at a premium, we must try to produce "big pumpkins," and if the fashions of wine drinkers change, we must follow the fashions. For ourselves, we can do as other people do, and be thankful for plenty without fashion.

The Influence of Varieties of Vines.—As to the varieties of vines and their influence over certain well recognized characteristics of types of European wines, which are favorites in commerce with non-producing countries, the first lesson has been well learned and is understood by our growers, although it is little comprehended by wine critics, who only know qualities as shown by the merchant. We know that if it were practicable to change the varieties in all the celebrated districts of Europe, the fashions in trade would immediately vary because the recognized types would disappear. This would be less noticeable, however, with respect to those wines which depend for their style more upon art in treatment and change of character through climatic influence after the first fermentation, than upon simple preservation of natural fruity freshness. In proportion as the skill of the wine maker and merchant is confined to the preservation of natural wine, which is the simple fermented juice of the grape, against external influences, such as heat, cold, light, oxidation, and hostile ferments, in such degree is the distinctive character of the producing variety of vine made more apparent and essential to the type. Hence. to reproduce types of the genuine high class Medoc clarets, the sauternes, the burgundies, Rhenish white wines, delicate champagnes, and natural cognacs, we must look exclusively to the identical varieties, which only have and can produce them. This is a *sine qua non* for such types, all other conditions of growth, method, and development being equal or unequal. If the natural conditions of cultivation, fermentation, and development are different, the skill of the producer must become original and different if he would produce like results from the same fruit. So far as he attempts success in such lines, he is far from being an imitator, because his art is his own creation, unless he makes use of artificial material to give semblance of natural reality to the product.

With respect to wines, the favorite characteristics of which are the direct results of method of treatment and external influence upon development after fermentation, the wine maker is less bound to the selection of certain varieties of vines. This is more particularly true of sweet and fortified wines, the most important products of hot and dry countries, commercial types of brandies and champagnes, and ordinary classes of dry wines. The greatest exception to this latter rule is in the case of families of grapes of totally different species, such as the native vines of

America, and such European varieties which have persistent flavors, like the Muscat group, and inconsistent colors.

Where oxidation by natural exposure or artificial means is a leading element of development, the bouquets peculiar to fine, delicate dry wines, as well as also some of the fruity flavors, are of little consequence, because these are destroyed by the method or the climate. The questions of saccharine strength, degrees, and qualities of the common acids, the more or less permanent mucilaginous and gummy properties and mineral constituents, and the origin and quality of spirits added, are of chief consideration. The variations caused by different varieties of vines, suitable to the general method and treatment, do not control in the general recognition of the type.

Where sugary sweetness and alcoholic strength are very prominent, there is still less necessity of adherence to particular natural flavors and bouquets of varieties, excepting in the few instances of persistent aromas, such as the Muscat.

To make a true type of Medoc claret, it is absolutely necessary to cultivate the *cabernet* with its customary associates; so of Sauternes—the *semillon*, *sauvignon blanc*, and *muscadelle du Bordelais;* so of Burgundy—the *pinots;* so of the fine Rhenish whites—the *riesling*, *gutedel*, and *traminer;* but good characteristic port is made from any, many, or all of a hundred different varieties; and sherry, notwithstanding its subordinate classifications, is recognized as sherry, whether of one or more of the numerous varieties grown, suitable to locality and method. Quality, rather than character, depends upon the variety in such wines; with the fine dry wines, character depends upon the variety, and quality is influenced by the season, the method, and the climate, artificial or natural, during development.

Our experiments in California help us to explain much that has seemed secret in peculiarities of European wines. Negative and partially positive results reveal the lines of future progress; financial ability to engage in new enterprises, while knowledge is with us, and inducements of profit are the present necessities. Another generation without the same experiences will be scarcely more advanced than we are, if we are not encouraged to complete our work to the extent of our ability.

The principle of science in our time, if discovered and applied, will become the "rule of thumb" for our children.

It is because the wine makers of Europe, skilled in local practices, have little or no comprehension of the reasons for their rules, that they fail so conspicuously in leading our people, when they come among us. To-day in California the best and most progressive wine makers are our native-born citizens, because they have no prejudices in favor of a "rule of thumb," which has no reason except under certain conditions. It is easier to create new art than to transplant an old one. Out of European wine making and our own experience, we must construct some sort of rude science sufficient to enable us to invent new rules for the art to suit new conditions and demands of trade.

THE INFLUENCE OF THE SOILS.—It has been a favorite hobby with writers and a certain kind of so-called agricultural scientists to attribute the special qualities of fine wines to the soil, with the implied understanding of direct extraction of soil elements to produce such results. Therefore there has been a vague popular belief that the proprietor of a

certain piece of land has a patent right of nature, or a sort of monopoly over certain appreciated excellencies of bouquet and flavor. A vague notion has prevailed that through chemical soil analysis the secret of vegetable compounds of the highest distinctive characters, constituting the qualities that appeal to the fancy, might be discovered; that, for instance, the chemist might locate a second Lafitte, Yquem, or Johannisberg. The persistency of quality of a certain kind, attached to the products of certain vineyards, as distinguished from others in their immediate neighborhood, has lent a sort of charm to this idea and caused it to be unduly magnified.

I will not deny that, to a certain extent, particular quality is, more or less, a question of locality; but locality implies much more than the chemistry of soil. Locality suggests not only the soil composition, but also its conditions as to depth, drainage, exposure, tillage, fertilization, method of culture, proportional distribution of varieties of vines, shelter, rainfall, sunlight and its own peculiar climate, the geological structure of surface and sub-soils with reference to influence upon a certain equilibrium of the vital forces of nature, etc. No two separate pieces of land can have exactly the same adjustment of all conditions influencing vegetation at the same time; yet it may happen that in different seasons the peculiar usual development of one place may be reproduced approximately in another in an alternating sense.

The stoutest believer in soils will not deny that in certain seasons the most celebrated vineyards produce ordinary qualities, and are surpassed by neighboring places of less reputation. It often happens that a *bourgeois* is superior to a *premier cru* in the Medoc.

I find from frequent recurrence to this subject in conversation with amateurs and merchants, that the laws of plant growth and the chemistry of the particular qualities under discussion are little comprehended. Few understand how little the plant extracts from the soil and how much is elaborated by the foliage from the atmosphere. Few understand that the plant grows and develops its tissues from the top downwards, or that the chemical elements of the most delicate perfumes and the coarsest vegetable acids and sugars are present in all soils and all climates where vegetation is practicable. A rose, a violet, and an onion growing in the same pot, each develops its characteristic odors, flavors, and colors, though more or less affected by surrounding influences. Change the conditions of heat, moisture, sunlight, shade, drainage, etc., while retaining the soil identical—the results of vegetation will vary. Soil analysis has never explained the odors of the violet and the rose, nor the flavor of the onion.

We do not need to remember that wines are greatly distinguished by different seasons of vintage and the circumstances influencing fermentation and cellar management. We should keep in mind, however, that totally radical changes of climate over a given vine district would radically change the nature of products, especially if the methods of the cultivator and wine maker remained the same. We may feel sure that if we should be able to transfer the climate of the Rhine to the sherry district of Spain, sherry would cease to be practicable under the usual methods, and the *bodegas* would be filled with vinegar. The search for a natural sherry soil in Burgundy would be as useless as the quest for the philosopher's stone. It may not however be as useless to seek suitable soils under comparatively similar climatic conditions for cer-

tain known results, nor may it be impracticable in all cases to modify methods and treatments to suit changed conditions. The forces of nature are in many ways subject to human control.

Modification of Natural Forces Through Art.—The control of nature's forces over wine making and development is, of course, a much easier problem than the control of climatic influences over vegetation and the ripening of fruit, yet even in this last direction art has already won some victories. The ordinary man soon learns that an early ripening vine requires a southerly exposure of warm hillside in a northern cool, moist climate, but should be planted on a fresher, cooler soil with protection from excessive sunlight in a southern hot and dry climate. He soon learns that excessive green foliage late in the season in cool climates retards development of sugar in the fruit; so on the Rhine he strips the leaves. In the hot dry south, however, he so attempts to manage his vines as to favor foliage and shelter his fruit. High and low pruning, narrow and wide rows, early and late picking—all have reference to modifications of vineyard labor to suit climatic differences. In these respects the cultivator of the vineyard is more advanced than the wine makers, who generally adhere to primitive methods and results, and trust to merchants to correct their blunders. Brewers have much more scientific work to their credit than vintners. The greatest skill prevails where the greatest natural difficulties beset the wine makers, and the greatest slovenliness and carelessness where nature offers the widest opportunities. Where the vine flourishes best, as in Spain and Italy, the commonest results are general; where the opportunities are limited, as along the extreme northern boundary of viticulture, the greatest care is shown. The literature of the vineyard and wine cellar is the literature of the north; the literature of the south, with rare exceptions, is the advertisement of the merchant.

California's Danger.—California being highly favored by nature, is in danger of drifting into Spanish methods. Already we feel the terrific force of the competition for cheapness and a great decay of the zeal for progress in quality. American genius takes as naturally to a labor-saving machine and a big tank as a Spaniard adheres to a wooden plow, a *burro*, a goat-skin bag, and the naked filthiness of a peasant's foot.

Cheap imitations, machine celerity, and mercantile haste to reach consumers, everywhere with us antagonize the amateur, the connoisseur, and the student of possible excellence. Yet it is a large part of my purpose to discuss possible excellencies, as well as to suggest improvement within the bent of ordinary effort.

Unclean Methods of Europe.—From European cleanliness, excepting a little creditable to Germans, we have not much to learn. Wine making in France, Spain, Portugal, Italy, and the far East is unspeakably filthy. In many cases the products are in such vile condition that they become merchantable only through the aid of the chemist. It is a popular delusion that wine cleanses itself of all impurities. Nothing is further from the truth. Every reader knows to what extent the most careful wine makers caution against exposure to foul odors. The difficulty of removing bad and foreign tastes is familiar to every merchant. The persistence with which wines even in bottle retain living organisms,

such as the germs of disease to which Pasteur has given scientific attention, is too well known. The disgusting taste of tar in many Grecian wines, communicated to wines transported in rude goat skins smeared with tar on the hair, which is turned inside, is known to travelers. The dirt in Grecian currants is familiar to the housewife, but she little comprehends its nastiness.

Fancy a people of refined taste placing on their tables water from their bath tubs, which has been allowed to settle so as to be clean to the eye. Fancy them going into ecstasy over a wine in which the Prince of Wales had bathed himself after a hard ride on a hot day! We need not fancy such things about the grand Burgundies, the wonderful Bordeaux clarets, and the glorious ports;—they are veritable facts, and the wonder is that they are known and tolerated. The difference, not in favor, but against the actual facts, is that foreign wine vats are not the bath tubs of the aristocracy, so much loved by the rich, but of as filthy and unwashed a lot of coarse peasantry as can be imagined. With few exceptions, every berry of the grapes in foreign vineyards is not only broken but rubbed in its own juice with the sweating feet of those who seldom wash except in the wines that our epicures drink. In some places, especially in Burgundy, not only the feet but even the whole naked bodies of men are immersed and kept there until the juice is warmed to assist fermentation; the men that do this work are huddled together during their sleeping hours like workmen in a railway camp. It is no wonder that epidemics spread rapidly in Europe, whether by contamination of their beverages, or the general nastiness that prevails everywhere among the common people of the southern and middle nations. German, Dutch, and English cleanliness of person and methods is remarkable by contrast. How much of the bouquet of European wines is due to sudorific influences and garlic, we need not investigate. Some things should be left to the imagination.

In California our methods are at least cleanly as to wines, dried fruits, raisins, and olive oil.

Charlatanry and Scientific Research.—I have touched lightly on the chemical composition of soils, and with undisguised contempt for the pedantry of ordinary agricultural chemists, who are very often charlatans, to be classed with quacks and the vendors of specifics. The truly competent agricultural professor should be an unbiased devotee to all natural sciences, stimulated by a most respectful regard for the leadership of art, which solves most questions of practice in advance of science. Men know most things before they comprehend reasons; they improve what they know by understanding reasons. They make new rules for changed conditions through an understanding of reasons; hence the importance of deducing the science of old industries in order to transplant them to new countries under new conditions. The science of viticulture and vinification with reference to novel adaptations has yet to be written. Observations of practical value, tentatively scientific, may be of great value to encourage experiment, but they are scarcely beyond the stage of problematical hypothesis. So-called scientific treatises on all branches of agriculture, which presume to furnish general reviews and complete expositions, contain only a "smattering" of many sciences, interwoven with much that is pure art unexplained.

How to farm profitably is generally better taught by the economical,

industrious, practical man of experience than by a whole corps of professors. This remark is not intended to discourage scientific research for the aid of the agriculturist and manufacturer, but rather to stimulate the same by indicating a world of new discovery. Meanwhile all honor to art, be it led by science or the "rule of thumb"; and preëminence to the artist as teacher, who shows how a thing is done, whether he understands the laws of its creation or not.

Soils Considered in Connection with Local Conditions.—The discussion of soils, so far as I have been able to perceive, relates more to their geological character and situations, under given surrounding influences, than to principles of general application. So far as such discussion relates to simple questions of fertilization and certain known necessities of plant life, it falls far short of determination of delicate questions of fine and distinctive qualities. Fertilization appeals to the producer generally from the simple standpoints of economy and profit. It does not show how to change low grades of wines into fine grades of exceptional standards.

It may be said that along northern limits of viticulture, especially where humidity of atmosphere is conjoined with short seasons of summer heat, calcareous and stony soils, with more or less prominence of iron constituents, and a minimum of humus or vegetable debris, are the best for fine wines. In proportion as the soils receive and retain greater moisture in such climates, in such proportion is an elevated and easily drained situation desirable, as well as also the exposure to the sun, which favors warmth, evaporation, and the checking of redundant vegetation. For these reasons, large crops and high quality are always inconsistent in northern viticulture. Stony soils absorb heat and radiate it during the night, thereby modifying the local climate about the vines. Very sandy soils abstract heat at night and cause chills near the surface about the vines. Calcareous soils favor a certain degree of aridity during hot weather, check excessive foliage, and favor early maturity and conversion of fruit juices into higher saccharine developments. Excessive fatness of soil, or so-called richness, especially if continuously moist, in such climates, favor leguminous plants, and cause redundant and late green foliage, but are unfavorable to seed, nut, and fruit developments, especially of the kinds which naturally require long warm seasons. The oils and sugars of nuts and fruits do not develop well while new vegetation is in progress. The herbaceous growths should ripen in advance of or together with the fruit. Grapes in certain situations often produce two or more crops, on account of continued vegetation at the time the first crop is developed. The first crops in such case are of poor quality; the second are frequently superior. In the tropics, where a certain moisture, not excessive, prevails, and vegetation continues almost continuously, grapes may be constantly in bloom, but produce only sour, disagreeable fruit; so also in the north, where foliage is green until the frosts come. It is a familiar fact that many fruits in northern regions, where sharp cold follows very warm moist summers, become edible only after the frosts have stripped the leaves, checked the sap, and permitted the hanging persimmons, grapes, etc., to complete their transformations of acids into sugars.

Atmospheric Warm Humidity Hostile to the European Vine—Excessive Cold.—Continuously warm atmospheric humidity is fatal to the *Vitis vinifera*, or European grape varieties, in ordinary field culture. Excessive cold in winter is equally so. Warmth and moisture in early winter sufficient to prolong vegetation, defeat the ripening of fruit. The viticultural zone is therefore not controlled alone by isothermal lines. A temperate climate, a comparatively dry atmosphere, without continuous saturation of humidity, or one that favors evaporation of water and vegetable moisture during the summer, and especially the fall months, and a mild but cool winter—these are the characteristics of the zone for the cultivation of the European vine. If these conditions prevail, even though the aridity is desert-like, viticulture is still practicable by means of irrigation. The relative degrees of summer humidity of atmosphere affect seriously the numbers of varieties of vines that can be successfully grown, because some are more susceptible to fungoid diseases than others; the relative degrees of heat and cold, especially the influences of early and late frosts, affect also the numbers of varieties that may bloom and ripen fruit, as well as in some cases, continue to live.

The humidity of the atmosphere in summer and the excessive cold in winter are fatal to the European vines in North America east of the Rocky Mountains. West of the Rocky Mountains, from British Columbia to Central Mexico, are found the ideal climates for the European vine. North of California, summer humidity diminishes the possibilities to the minimum. Away from the coast fogs, throughout California, everywhere, excepting at very high altitudes, or on absolutely sterile soil, or soils impregnated with excess of certain alkalies and minerals, or in very low lands, subject to excessive moisture, or frost, the European vine finds an ideal climate varying only in degree, but by such variation rendering adaptation of early and late ripening varieties a simple question. Within this great region, which comprises more viticultural area than all of France and Spain combined, every general classification of soils, geologically considered in viticulture, is found. On the hot plains and in the valleys of the Colorado Desert, Arizona, and Northern Mexico, we have practically all the conditions of Northern Africa and the Oriental Mediterranean regions. Our problems of adaptation require us to study the necessary relations between rainfall and certain kinds of soil, and variations in the degrees of summer heat, and in some parts irrigation. These questions have been rapidly solved, the whole world of viticulture having been drawn upon for nearly all its most appreciated varieties; yet we suffer in products to some extent from the fact that many of our districts are still, more or less, like botanical gardens, full of unnecessary and inconsistent experiment. This defect is however fast disappearing, and it may not be long before the local types, as in Europe, will declare themselves, through the operation of the law of survival of the fittest and selection. Our danger now is that in passing from experimentation to selection based on experience, we may be too much controlled by considerations of quantity vs. quality and the demands of trade for relative cheapness.

Studies of Soil and Climate in the Medoc and Other Districts.—I must not pass the question of soils without reference to certain celebrated vineyards uppermost in the minds of amateurs, who love to dwell on this subject. Consider, for instance, the various classifications

of the vineyards of the Medoc, which include the first, second, third, and fourth *crus*, the *bourgeois*, and *ordinaires*, as well as distinctions of minor importance, and the mercantile grades, which relate to differences in quality between the middle good grades of the different communes, such as Paulliac, St. Julien, and Margaux. The distinctions of quality, referable to certain vineyards, such as Chateaux Lafitte, Latour, Margaux, Leoville, Brown-Cantenac, etc., are not as invariable for different seasons as many connoisseurs imagine. The Bordeaux wine merchants well know how much depends upon the year of vintage and how much depends upon reputation of the private trade-marks. In some years a Chateau Lafitte is intrinsically worth less than a lower classed wine of another commune. The years of finest vintages are in such climates the years when the fruit is free from disease, attains its highest degree of sugar, and is picked and fermented under the most favorable conditions. The best vineyards are those which ordinarily produce fruit in the highest condition of maturity. The perfect maturity of the fruit depends largely upon local conditions, such as elevation, drainage, and relative depth of surface soil; also upon the more or less vegetative vigor caused by richness of the humus; also upon the method of pruning; also upon the degree of skill and attention to detail governing the gathering of the crop. The Medoc is a long, narrow strip of gently undulating gravelly land, bordering the tidal water of the Gironde, and protected against the harsh wind and fogs of the ocean only by a low range of sand dunes. This region extends nortwesterly from Bordeaux toward the ocean and the entrance from the ocean to the Gironde. As the ocean is approached, practical choice viticulture gradually ceases. In the direction inland toward Bordeaux, the vineyards are generally on richer soils, subject to drier and warmer atmospheres. It is apparent therefore that no two vineyards can be under exactly similar conditions for the perfect maturity of fruit in the same year, but that there may be certain general averages of condition for each, which may maintain general characteristics. The varieties of vines, being to a certain degree the same over the entire Medoc, and its general features of climate varying only in a small degree, it is not surprising that the wines, as a whole, show a certain average of qualities common to all, which cause them, whether of the first or the fourth grade, to be easily recognized as Medocs. Yet of the five varieties of vines generally cultivated there are probably no two vineyard collections in exactly the same proportions, which is of itself sufficient cause for certain marked differences in the wines. Of these five varieties, there are no two which come to perfection at the same time, hence one spot may be more favorable than another to each. None of these varieties bear equally well in different years, owing to the different periods of blooming and the varying effects of weather upon the blooms. One year the *cabernet sauvignon* produces better than the *cabernet franc;* another year the reverse is the case; hence the actual proportions of fruit of the various varieties entering into the wine of one vineyard varies more or less every year, which is of itself one cause for some variation in the wines of different years. I have further noticed certain distinctions in the various plants of one variety, not sufficient perhaps to warrant a change of name, but probably quite enough to affect in some degree the quality. Vines are extremely subject to sports, which are capable of differentiating the variety if carefully selected and propagated. Through

long continued propagation and replanting, by means of cuttings and the customary grafting of barren stocks with wood selected from the more prolific, a single vineyard may gradually develop peculiar characteristics of its own, which escape the ordinary observer. In the most noted vineyards it is the custom to replant one thirtieth of the area every year, jealously adhering to cuttings of the vineyard itself, without recourse to others where apparently the same varieties grow. Vines of the different kinds are associated promiscuously with only a pretended assortment of certain ones to certain rows or blocks. The peasants, who control all the practical field work, pretend to be able to pick out the different kinds during the winter, when making cuttings; yet I have never seen any lot which we have imported that did not contain a mixture. I have discovered in my own vineyard at least three distinct *cabernet sauvignons*, each differing from the other in vigor and fertility.

We know well that different wine makers, apparently following the same methods in different cellars, produce results which are recognizable as different, although using grapes from the same vineyard. The slight unnoticed variations of skill and method, and the local differences of conditions in different cellars which cannot always be inquired into with exactitude, are capable of influencing results sometimes to a remarkable degree.

It must be self-evident, therefore, that it is not easy to determine the particular characteristics of wines which owe their origin to the peculiar chemical composition of any given soil. It is much more practicable to group together all the leading features of soil character, climate, varieties of vines, and methods, which distinguish certain districts producing peculiar types, and to leave the more delicate distinctions to chance and the speculative theories of amateurs.

In Sauternes we find that the main distinctions are intimately connected with altitude and method. Chateau Yquem overlooks all its neighbors, both physically and in quality. This is generally true, wherever excessive maturity of the grape is desirable.

In the Xeres sherry districts there are more easily determined distinctions of soil qualities, especially between the *albarissas*, or whitish calcareous earths, the *bugeos*, or black heavy lands, and the *arenas*, or sandy places. Without ignoring any possible direct communication between chemical soil constituents and the special qualities of value in wines, it may also be assumed that whether the soil be black or white may have a direct connection as a condition affecting warmth and the rays of sunlight in their relations to the development of vegetation, as we well know that sand has upon temperatures during the night. A condition affecting the influence of sunlight may produce nearly opposite results in different climates; hence, a stony land favorable to a certain result in one region, may not be conducive to similar objects in another. The vines which require thin, rocky soils of warm hillsides in one country may find their best conditions on richer lowlands in another, or on cool northern exposures.

Experienced vine growers of California must necessarily perceive many local applications in this State for the general observations I have made, without great particularization on my part. Intelligent connoisseurs, who may read this treatise at a distance from our coast, will readily perceive that the problems involved in attempted reproduction of Old World styles of wines in any new viticultural region are interest-

ing in possibility of achievement and much less bound up to popular theories than has been supposed.

Early Viticulture in California—The Mission Grape.—The earliest vines cultivated in California illustrate the simplicity of taste of the Mission Fathers. They evinced very little knowledge of the possible variety in horticulture and viticulture, much less than must have been common to the peasants of Spain. Their work shows little evidence of manifold experimentation. The list of plants and trees everywhere propagated by them was of the simplest kind. Evidently they knew nothing of the catalogues of nurseries, if such then existed.

The variety of vine which we call the *Mission* appears to have been their sole reliance for wine making, without any effort to experiment with others. In the early days of our State there were at least two other grapes at the Missions, probably used for table fruit. One of these was a variety with Muscat flavor, similar to the German *Muscatel*. I have found a description of an Italian vine called the *Monica*, which seems to be the same as our *Mission*. The illustration of fruit and foliage is a perfect picture of our own favorite of the Franciscans. The *Monica* is described as a favorite in the monasteries, and its wine is said to be rather flavorless, but adapted to a certain sort of heavy liqueur style, probably favored on account of its easy adaptation to rude methods of wine treatment. This vine, once so much cultivated in California, is now fast disappearing, because its product is not satisfactory to the trade, which requires material approximating the wines of general commerce. It has, however, proved the durability of a type dependent upon a certain variety, and has shown no perceptible change, either for better or worse, by reason of long transplantation from Europe. It varies in certain qualities according to location, but has not appeared to suffer material change in one locality, although we have had young growths during forty years to compare with the oldest still extant.

Preservation of Vine Characteristics when Transplanted to California.—The notion crudely and ignorantly expressed by Thudichum, in his latest treatise on wines, published in England, that cultivated vines to be permanent in variety must be of indigenous stocks, and that exotics degenerate, or die out, is disproved by the *Mission*, and more particularly by the experience we have had during forty years with other European vines planted side by side with the *Mission* in many places. Neither has the *Mission* changed, nor have the *Zinfandel*, the *Rose of Peru*, the *Muscat of Alexandria*, and others of long growth shown any signs of losing their identities, or of approximating the *Mission* in character, or of losing vitality.

The large collections of varieties imported from 1850 to 1861 were scattered throughout the State, but were mostly lost, through the desire only to propagate those which yielded the largest crops with the least labor in pruning. Accident preserved a mixed lot, few of which, excepting some of the Rhenish stocks, were ever associated with the production of fine wines. The *Zinfandel*, of Hungarian origin, the leading varieties of the Rhine, and a few of the most prolific from the hot climates of the Mediterranean coast of France and Spain, have been the noticeable sur-

vivals of the second era of California viticulture. None of those show any signs of decadence or degeneration. Their products are as distinctly characteristic now as ever before.

THE LAST AND PRESENT ERA OF EXPERIMENTATION IN CALIFORNIA.— A new era of more systematic propagation marked the years from 1880 to 1885. All the known varieties most esteemed in the celebrated wine regions of Europe were reimported, and attempts were made to adapt them to the ends they had served with distinction. Improper locations were frequently made, and in many cases large vineyards were separately blocked out for all the types from Spain to the Rhine. Close approximations to desired results have become quite common, but are better appreciated by the studious vine grower and the merchants, who make a practice of examining the numerous styles of new wines in country cellars, than by the distant markets, which receive the *pot pourri* of trade. Again, however, there is a set-back, tending toward cultivation for quantity rather than quality. The pioneers, in efforts to attain the highest types of dry wines, have had their enthusiasm seriously checked by want of financial encouragement from trade. A few only are able to continue in a line of progress, which to be remunerative requires the producer to become his own broker and merchant. Much is now known as to necessary improvements in methods and as to possible quality within easy grasp, which cannot be practically applied for want of a special class of merchants to select, save, and develop intelligently the best new materials and to pay remunerative prices. It is difficult under our present conditions to combine together all the arts of the cultivator, wine maker, wine blender, cellar master, bottler, merchant, and broker. A few have attempted this combination of rôles, but in the effort, one or more of the necessary elements of success have suffered from inexperience or neglect. In some cases, the original vineyardist has degenerated into the eager merchant, careless of all save immediate profit; in others, financial failure; in others, a cessation of progress at the vineyard, while fair medium results under private brands are painfully kept alive with anxious hope that the mercantile end of the business may find occupants who will enable the vine-grower merchant to go back to his first love under prosperous conditions.

In all this time, however, the distinctive qualities of a large number of the celebrated varieties of vines have shown themselves to be persistent under favorable conditions of culture. We have many experts now, who can go from valley to valley, and, in hundreds of different cellars, name the different grapes from which the different lots of new wines were made, thus proving that transplantation and preservation of distinctive characteristics are possible.

In this latter respect I write more particularly of new wines during the first six months after vintage. During that period the percentage of choice material in our cellars is quite large, and sufficient to gladden the souls of aspiring amateurs. A few comprehend how to preserve and develop these naturally good qualities, but many do not, or cannot, if they do.

PRESENT PROBLEMS OF OUR INDUSTRY.—In commenting upon the difficulties which prevent the best possible presentation of our wines to the consumer, and the defects which we are conscious of, but are prevented

from curing by causes not connected with natural impossibility, we are led at once to what may be termed the problems of our industry.

We have now several questions relating to varieties of grapes, such as the following:

First—In the light of our present experience, how shall a new-comer, who has no land, select a suitable location for the cultivation of certain varieties with the desire to approximate the results that have made such vines celebrated elsewhere?

Second—How shall a new selector and planter choose location and varieties with greatest chance for profit, regardless of special fancy for special quality?

Third—How shall the present owner of land plant with the view to the best quality?

Fourth—How shall the present owner of land plant with reference to the greatest profit?

Fifth—How shall the present owner of vineyards proceed to attain the best qualities out of vines, such as he has about him?

Sixth—How shall the present owner of vineyards make the most profitable uses of his present vines?

Seventh—How shall the wine maker who purchases grapes from those who do not make wine, proceed to produce the best possible results with attainable material?

Eighth—How shall the wine maker who purchases grapes, proceed to make the greatest profits?

Ninth—How shall the wine dealer proceed to develop the best possible qualities out of present available material?

Tenth—How shall the wine dealer proceed to make the most money with the least risk out of present material?

Eleventh—How shall the wine maker and the wine trade popularize the use of wine, with a view to future profits, and reputation, and increased production?

Twelfth—How shall the wine trade popularize present products for immediate profit?

It must be apparent that a full practical discussion of all these problems would involve me in greater mass of details than can be undertaken in this paper. I have arranged these questions alternately with reference to the great overlying question of quality vs. quantity, or possible quality vs. possible profit.

The Questions of Markets.—I have on various occasions called attention to abnormal relations between our California producers and Eastern American markets, showing that the natural laws of demand and supply were interfered with either by inadequacy of mercantile resources, or false conceptions and ignorance on the part of merchants. I contend that it is the fault of trade that our producers do not find a much greater demand for our products than we now enjoy, and that the relations between producer and consumer are artificially perverted; that commerce is not equal to its opportunities. What may be ignorant bliss to the consumer is disappointed hope and poverty to the producer. The merchant, to a certain extent, is a diplomatic agent; he must often persuade the consumer to accept a substitute for the commodity actually desired, but if he fails in correctly interpreting popular taste, he fails to correctly

advise the producer, and ends by destroying demand. His mission becomes in such a case that of a trade killer.

Incidentally, in connection with this subject, I shall here introduce a copy of an article, which I wrote for the last New Year's number of "Bonfort's Wine and Spirit Circular," published in New York. It was a review of California wine conditions, specially intended to interest the New York wine merchants:

STUDIES ON THE CALIFORNIA WINE TRADE.

(From Bonfort's Wine and Spirit Circular, January 10, 1894.)

While accepting with pleasure an invitation to contribute to this issue of "Bonfort's" an article on the California vintage, I shall make no apology for avoidance of ordinary statistical information, such matter being within the province of your regular correspondent.

It is impossible to comment on California wines, however, without more or less consideration of future prospects, because the methods of making known to trade even present advantages are far from perfect.

What California wines seem to be, and what they might be, if the growers and dealers were as closely united and as intelligently guided as in Bordeaux and tributary regions, are subjects upon which very different opinions are entertained.

During the last two months I have had an opportunity to study closely in New York the relations which our producers and dealers in California bear to the trade here; also their attitude with respect to what appears to be the taste of consumers.

I do not find any standards in New York according to which wines are valued, bought, and sold, irrespective of their places of production. I do not find any catholic spirit of mercantile effort pervading the wine trade. Either foreign or native provincialism has been the general rule; the one disdaining American ambition, the other appealing to native prejudice. The exceptions have been mainly among some prominent dealers in American wines, who recognize varying popular demands, and give the foreign goods a fair chance in their cellars. A disposition to abandon foreign provincialism is now noticeable among some of the importers, but it is far from that cosmopolitanism without which an unpredjudiced American wine trade cannot be developed.

This condition seriously affects the qualities of vintages as they are shipped from California. Our producers are compelled to accept the standards fixed for them by their own representatives and suffer for want of friendly guidance by more experienced leaders.

Wine is largely what the dealer who handles it demands, rather than what the producer is capable of making, or what the consumer would prefer.

Among New York first-class retailers, and the most gentle classes of consumers, there is a general complaint that California wines are too strong and lack refreshing qualities; that our brandies are coarse and lack refined flavor, such as is looked for in higher priced imported goods. In California, however, the producer is told that the market demands heavy body, high color, and strength, and that fine qualities are not appreciated sufficiently to pay for the comparatively small increase of cost necessary to insure delicacy. The truth is that the provincial foreign agent practically monopolizes one class of trade, and the provincial American agent caters to the uneducated, or to those who are willing to sacrifice quality for cheapness.

The actual resources of the California vineyards and wine cellars are therefore little understood.

If really fine, delicate brandies are actually wanted in New York, nothing is easier than for California growers to change their methods of fermentation. If light, good "second wines," such as are common in France, and largely blended for exportation, to be consumed by men who think that the quality and value of a wine is determined by the quantity they can drink "without feeling it"—if such wines are wanted to take the place of most of the French clarets, the secret of production is not difficult to impart.

If thin, acid, green light wines, raw in taste, colicky in suggestion, such as European peasants drink, are demanded for any refined taste, as appears to be claimed, nothing is cheaper—not even hay—than unripe grapes in California.

If importers would annually expend a small part of the money they now pay in duties in the pleasurable and health-giving enjoyment of a tour among the California vineyards, showing by samples what their trade demands and offering remunerative prices if their wants are supplied, they would make more money and shout more like Americans on the Fourth of July.

I am well acquainted with European vintages, and appreciate the grand wines of the world with an enthusiasm not yet extinguished by long, thankless work in the American field, trying to render what is scarce less scarce. I know from practical experience and intimate acquaintance with the many different vineyard districts of California, that, if provincialism were banished from the New York wine trade, and her wine merchants were well informed as to our State and on friendly terms of communication with our producers, the qualities of our products would rapidly change, and most of the legitimate wants, now supplied from foreign sources, would be filled by us.

I am passionately fond of fine wines wherever produced, and hold in great respect the connoisseur who permits his taste to be governed by no provincial palate, but I am not ashamed to hold that the commercial principle in this country should be that the sale of foreign products in our markets is only excusable on one of two grounds, viz.: the foreign products should be either cheaper or better than the native. In accordance with this rule I claim that as between two lots of wines, not affected by trade marks, of equal intrinsic value, prices offered should favor the native product, and that the merchant who encourages favor for the foreign because it is foreign, is to say the least unpatriotic. If such merchant be a foreigner by birth, he is unqualified for naturalization, and should be wholly ignored by our law makers.

We know, however, that this rule does not prevail in the wine trade.

If there are any California wines which are equal intrinsically to others of the same class imported, and which are not distinguished by any private brands of popular fame, such wines should command readily and without reluctant acceptance at least the same prices as their competitors in trade. We know that very few good mature wines of any class can now be imported and offered, duty paid, in casks, at wholesale, for less than $1 per gallon. Who is to blame for the fact that such grades of California wines in New York will not bring the price paid in duty on the foreign?

Probably no one is to blame for a custom. It is the custom of New York of which I started to write, as a necessary prelude to any general discussion of California wines. The custom, I believe, is changing. Knowing, as I do, both the California vineyards and the foreign, I am not afraid to predict that when this custom has changed, so that we may speak of American wine merchants, and not of importers and native dealers, present deficiencies of our own products will rapidly disappear. I believe, also, that I may live to see the day when here it will be as difficult to sell an ordinary foreign wine without an American label, as it is now to sell an American wine without a foreign label; such is the spirit of France, and it is a stronger bulwark of national wealth and industry than a protective tariff. So long as the trade favors the prejudice for foreign goods, so long will American producers demand protection through a high tariff. Merchants, as fellow citizens, are worthy of our comradeship under the flag; as foreigners, of toleration only.

But enough of causes which retard a proper understanding of California vineyards. A few words as to the present situation. The vintage of 1893 is about twenty million gallons. The average quality is said to be good; if so, the opportunities to make selections are grand, and there is no need to waste time in Washington trying to get a reduction of the tariff. New York importers will never comprehend these opportunities until they have studied the new wines of California before they have been moved from their original cellars, and before the spring following fermentations.

The chief defects in the wines as shown to the markets here, are due, not to original fermentation, but to bad management of the cellars during the spring and summer, and to blendings operated to suit the demands created by the large dealers in San Francisco. It is in the power of the trade in New York to select the wines when young, and so save the best from being blended and lost in the embrace of the common lots. It is also in their power to transport them before the spring to places of safety, and for this, large depots should be created in or near New York, with rail side-track facilities.

For ordinary clarets of good color and some roughness, containing undeposited albumen and excess of tartar, the long rail transportation across the cold Sierra and Rocky Mountains affords the cheapest of all methods for subjecting the new wines in January to the Burgundy treatment of freezing. Let the cars be side-tracked on the cold mountains, if necessary. The effect will be to paralyze ferments, coagulate and precipitate the soluble albumen with more or less of color, tartar, and tannin. Then if the wine, on arrival, is racked when still cold, into vats in cold warehouses, permitted to settle, racked while cold and filtered, the chief difficulties of clarets for the ordinary trade will have been overcome. Wines so treated would be ready for use during the year, would keep well, and could be handled with little cost. They would be much more palatable than the same wines kept in warm cellars and ignorantly managed during the spring and summer.

In most of the California cellars the clarets are spoiled in aging. The gentle mellowness, noticeable in a large portion of the new wines during the first six months, disappears with age, and, through various forms of secondary fermentation, is converted into harsh, disagreeable acids. The spring fermentation is generally looked upon in California as something necessary and proper, like the measles; sometimes this fermentation is necessary to reduce sugar that has not fermented dry, but even then the wine is seldom choice afterwards. Generally, however, this spring movement is a positive disease, and should be immediately checked by proper cellar work. The loss of mellowness, the increase of acid, and the destruction of bouquet essences, are the almost invariable results of ordinary cellar experience with clarets. Many growers do not comprehend why dealers will not give them more for their old clarets than for their new crop. The suggestion given above should be followed by experimental shipments this month. Care must be taken not to let the frozen wines become warm before racking and clarifying. Practice would soon tell what vintages would best stand this simple treatment. The loss of color will be an advantage to those who wish to bottle or to sell in packages for direct use.

White wines shipped in the same manner will not be so much benefited in age but

may be saved from loss of their original mellowness and fresh bouquet, as well as partially defecated; they should be racked and filtered after freezing while still cold.

The merchant who will select his wines before spring will have the chance to save many choice lots that otherwise become drowned in common wine.

Much misconception of our vintages and their possibilities springs from lack of knowledge of the circumstances under which growers work. As a rule, the wine maker is not rich; generally he is in debt. He is not in a position to develop a wine market. He expects capital to keep pace with him and supply the missing links between the vineyard and the consumer. The vine growers have done more than their share already, but they are grievously disappointed. Those who have attempted to follow the rules on which excellence depends, have suffered most. Quality and quantity are inversely related to the vineyard; yet so far quantity has paid the best. No special line of trade has sprung up to join hands with the best producers. With few exceptions the cellars are not culled when purchased, and with rare exceptions the wholesale trade does not make a difference of more than 5 cents a gallon between the best and the common. The man who gets ten tons of grapes to the acre gets 10 cents for wine; the man who, on a steep hillside, gets two tons and a half, gets 12 cents; and the 12-cent wine is mixed with the 10-cent.

The trade generally acknowledge greater merits in the white dry wines of California than in the clarets. The cause of this distinction is easily explained and easily avoided. The low prices offered by wholesale dealers to the growers, and the very small discriminations granted in favor of superior goods, have forced the majority of wine makers to adopt labor-saving machinery and to favor the grapes that yield the largest quantity of juice and sugar to the ton of fruit. There are many large wineries, where, with the labor of four men, from twenty to one hundred tons per day can be received, crushed, and passed into the fermenting tanks. In the case of white wines the crushed mass is pressed before fermentation, and the fleshy masses of unripe grapes do not yield to the press all their unripe juices. In case of clarets, the crushed mass remains together during from five to eight days, until fermentation is completed. Then the press forces the whole of the juices, ripe and unripe, into the wine receivers.

In France, no machinery for crushing is permitted in good wine districts. The green berries are not broken. So it is with a few advanced wine makers in California; but the crusher yields the largest quantity of juice, and the German taste which controls the majority of our cellars and dealers can find no fault with the result. The man who gets the most wine of a given alcoholic strength makes the most money.

If prices were in accordance with quality, and cellars were purchased after rating each tank at its value, bad practices would disappear. If it pays better to make poor wine, the consumer may have a right to complain, but not the trade.

In making sweet wine there appears to be little standard of quality set up. Most of this work is now done under contract, at a fixed price per gallon, the conditions being a certain degree of alcoholic strength, and also of unfermented sugar.

The cheapest grapes are generally used by large wineries, where grapes are purchased, for sweet wines, and the price depends not upon the quality of the fruit, but upon the degree of sugar. The brandy for fortification is distilled from anything cheap enough—generally from the press wines, or the wash from pomace. Sweet wines are quoted in value before the vintage as so much raw material, having no distinctions, except degrees of sugar and alcohol. This is not the fault of the producer.

Brandy contracts have been given during the past vintage as low as 30 and even as 27 cents per proof gallon on delivery in bond, with no distinctions for high quality. The producer cannot be blamed because the market will not permit him to distill his true cognac varieties, which are more valuable for wine.

I have not heard of greater distinctions in trade lots in bond for new brandies than 5 cents per gallon, and then only to a few distillers whose brands command reputation for uniformity, rather than differences in excellence.

A limited number of producers during the last ten years have patiently procured and planted the famous varieties of vines necessary to produce grander qualities of wine and brandy, and in all such cases have deliberately sacrificed quantity for quality. In the Livermore Valley this sacrifice may be generally set down as a loss in clarets of three fourths in volume in order to produce the Medoc types; but the market does not respond with compensating prices for the wines in wood. With respect to the true Sauterne types and the highest Rhenish, the sacrifice represents at least one half. The lighter yielding varieties require more expensive methods of cultivation, pruning, and training; must be grown on hill lands, yielding less to the acre and more difficult to cultivate; cost generally more than double to gather, on account of the light weight of bunches; yield less juice per ton; and require more care in cellar work. I have not yet seen the trade that will purchase these wines new at a price that will pay the cost of production. The few exceptional sales at fair prices do not cover the yield, which even now is comparatively very small.

The consequence of this unexpected result is, that growers ambitious of high grades are either forced to abandon their occupation, or to enter the market as bottlers and dealers. If the grower is not rich, he finds that he cannot place a vineyard brand, and cannot realize the profit he had reason to anticipate. Another result is, that growers are not now extending the areas of the finer grades, but are, in some cases, grafting back to more prolific varieties. The New York market knows little of our best wines. There is a better market for them in the West and at home.

The simple truth that I see now is, that New York is less critical than she used to be, and is in danger of losing her reputation as an arbiter of taste. Imported wines are brought to this market and passed over the duty, which would not be tolerated in London; and for native goods it is more a question of price than quality.

The vineyard area of California is now rapidly decreasing. No efforts are made to check the ravages of diseases. The reduction in the last six years has been almost thirty thousand acres. This reduction will be augmented under present uncertainties, and will continue until the ordinary new wines, in cellar lots, naked, bring 20 cents per gallon at the vineyard, and superior Medoc and Sauterne types 40 to 60 cents. All calculations for the future based on present bankrupt prices must fail. Meanwhile a large number of gentlemen who have devoted their fortunes to the cause of good wines, will go to the wall and become either indifferent or opposed to a trade which has been indifferent to them.

Among the vine growers I find a feeling which recognizes the objectionable phases of the liquor traffic more pronounced than among other classes. I am one of those who feel that if there are no prizes for excellence, there should be none for inferiority. And I feel, further, that if it shall be proved that importers have the power to crush us in our own country, it may be, after all, a fight of Kilkenny cats.

The proposed new tariff cannot long be misunderstood. It is reported that the tariff shall remain on still wines as heretofore, provided that it shall not exceed 100 per cent ad valorem. In other words, we are to have an ad valorem tariff of 100 per cent, provided that it does not exceed 50 cents per gallon. This, to those who do not understand the vast fluctuations of the wine trade, may seem just; but to those who are in it practically, the proposition seems absurd. Under such a tariff, at the present time, importers might avail themselves of the bankrupt prices for the unusual surplus in France, and fill their cellars at 25 cents per gallon, duty and transportation included. As soon as the French surplus, for which cooperage is lacking, is disposed of, prices would advance and a grand speculation would be made over the ruins of the American vineyards. The English duty of 1 shilling on still wines below 15 per cent of alcohol, and 2 shillings and 6 pence on fortified wines, would be vastly more sensible; but why change at all, so long as the market demands but little of superior goods and the home supply is adequate? Would the importers be pleased to have a fair investigation of the actual qualities imported, as shown by the Consular certificates? In 1878, when the duty was 40 cents per gallon on still wines, and there was no inducement to undervalue in the invoices, I obtained from the United States Consulates of Bordeaux, Havre, Marseilles, and Cette a complete abstract of all the wines shipped to the United States for an entire year, and am quite confident that the relative qualities have not improved since then. On the contrary, I find that the public taste has been vitiated through the absence and scarcity of choice wines, to such an extent that the connoisseurs of wines are fast disappearing. I believe that a change for the better can be wrought through a thorough abandonment of provincialism, and a careful encouragement of critical taste, based on recognition of merit, independent of all rivalry as to places of production. The manipulation of the tariff in the interest of cheap goods will only tend to demoralize the whole business still further.

Our hope lies in the present slightly changed attitude of the really competent and intelligent importers, whose superiority of experience and judgment is needed by the American producers as much as by our friends across the Atlantic. In the meanwhile I pledge myself, *ad majorem gloriam boni vini.*

CHAS. A. WETMORE.

I am happy to say now that the indications of a changing sentiment on the part of the New York wine merchants, principally engaged in importing foreign goods, which I referred to in the above article, has since developed more positively. Unless some foolish policy, such as a trust combination or the impatient destruction of vineyards, is entered upon in California, it will not be long before the New York wine market will be governed by new rules for brokers and distributors. What is specially needed is a genuine wine exchange and large storage cellars for the safe-keeping, development, and sampling of native and foreign products side by side, each being valued and rated on its own merits, comparatively and distinctively.

San Francisco is a good point for the storage and distribution of wines for the Pacific Coast and for the great western regions, but it is not a good place for the accommodation of New York and the Atlantic seaboard. Wines not reserved for special trade and bottling should pass from the producer to New York storage and management in their earliest stages and primitive conditions, so that the desired opportunities to select, blend, and develop may be afforded to the Eastern trade before

they have been made impossible through the arbitrary judgment of cellar masters on this coast, and before the freshness of natural qualities has been destroyed by hot and dry seasons in ill-managed cellars under our climate. The climate of New York is better than ours for the preservation of delicate dry wines. The individual excellencies of different vineyards would thus be made known to critical purchasers under favorable conditions, and the reward for quality no doubt be realized.

This is an important subject to consider in connection with future associated efforts on the part of independent wine makers, who are not under special contracts with the trade. A little effort would bring about a decided reform, and cause the establishment of exchanges in San Francisco and New York.

REFORM IN STYLES OF WINES REQUIRING IMPROVED METHODS OF FERMENTATION.—The form of contract recently presented by the new syndicate, consisting of seven of the leading San Francisco wholesale wine dealers, when it was attempted to form a trust to control at least 80 per cent of our vintages, provided that all wines should have at least 11 per cent of alcohol, subject to reduced valuations for less strength; also that all wines produced from grapes controlled by the syndicate should correspond in alcoholic strength with the saccharine degrees of the grapes delivered. During the vintage now in progress such a rule would require an average strength for dry wines of from 12 to 15 per cent.

The general complaint among Eastern wine consumers of the better class is that our wines are too strong, too heady. Light German and French wines for table use are preferred, and the former are especially gaining in favor, with an alcoholic strength of from 8 to 9 per cent. Americans are slow to adopt wine-drinking customs at the family table, or in hotels and restaurants, because good foreign wines are too expensive, ordinary foreign wines too low in quality, Eastern domestic wines from native grapes too peculiarly flavored, and California wines too strong. Light beers and ales are very popular and rapidly becoming the national beverage.

It is useless to explain the well-known reasons which cause the wholesale merchants to demand here high alcoholic strength. It is not useless, however, to say that, whether reprehensible or not, the methods of the wholesale manipulators in treating wines from the grower as raw material, valued according to the amount of "stuff" in them, have thus far failed to satisfy anything except the lowest class of trade. They certainly have failed to develop a popular demand for wine as an ordinary table beverage.

Americans will not become accustomed to the daily use of strong wines, nor to the habit of mixing their wine with water at the table. To make good, wholesome, palatable light wines the work must be done at the vineyard winery, not in the manufactory. Light white wines and clarets, with not exceeding 9 per cent of alcohol, are greatly needed to popularize ordinary daily consumption and large trade as well as the more generous fine wines for special occasions. Whenever a merchant appears who will promise profitable trade in such lines, it will be easy for us to satisfy demand. The art of making light agreeable wines, in good condition to stand the dangers of transportation, is not difficult to

learn; but it is very difficult to manufacture good wholesome and agreeable light beverages out of coarse, strong, raw products.

As to the defects in aging dry wines in hot dry climates, I have touched sufficiently upon the causes which indicate the remedies. We must avoid storage in very dry, warm places, restrict evaporation and draughts, and aim to get new wines into places of safety before the spring following fermentation.

Fermentation, especially of wines for ordinary uses, should be so improved as to favor the earliest possible elimination of albuminous matter left in solution, so as to permit early bottling. The popular notion as to the great ages of choice dry wines is an obstacle to the inculcation of correct principles. Ordinary wines should be ready for the bottle as soon as practicable, in order to preserve them from deterioration and unwholesome properties. The first requisite is perfect cessation of fermentative action; the second is complete defecation of albuminous matter; the third is deposit of excess of tartar, tannin, and other harsh principles. All these requisites must be accomplished without adulterants. Perfectly sound wine, free from albumen and excess of color, tannin, and tartar, will keep well in bottle, and preserve natural fruitiness and refreshing flavors, even if it contains a low degree of alcohol. The sooner it is in the bottle after it is ready, the better. This is as true of European wines as of ours, notwithstanding all the trade fictions to the contrary.

Sweet wines, sherries, Madeiras, and other alcoholic products, designed to be serviceable "on tap," may be best preserved and developed a long time in the cask, but the limit of practical advantage of age is far less than that generally supposed. Ignorance of proper methods of fermentation and early development and treatment is the chief cause of much of the common belief in the necessity of age in the wood. How long age should be in the bottle is a very different question and varies with almost every wine, but I can say with confidence that excessive age in wood or bottle is not conducive to the hygienic values of wines for daily consumption.

Wines to Taste and Wines to Drink.—We must draw a broad line of distinction between wines, commonly called "fine," but only intended for daily consumption as an ordinary beverage even at good tables, and distinctively fine wines, such as those which command fancy prices. At the tables of the most celebrated Bordeaux wine merchants, guests are first offered plain, ordinary, palatable wine, which is always drunk with a large admixture of water. When normal thirst is appeased in this way, fine old bottled wines are introduced and served in dainty glasses to taste and enjoy. No reasonably educated wine-drinker looks upon such offerings as ordinary beverages; if he should be inexperienced, he will be promptly told that a free and liberal use of "fine" bottled wines will prove injurious to his health. Such wines are to be tasted, discussed, and enjoyed after the ordinary cravings of appetite are satisfied.

Americans will not put water in their wines of daily use, hence we must encourage the production of very light drinks, carefully retaining the finer qualities by the highest development of our art. Such wines would become immensely popular.

SELECTION OF LOCALITIES NATURALLY ADAPTED TO CERTAIN DRY WINES. The chief difficulty in producing dry wines of really fine quality, delicate, fragrant, and refreshing to the palate, with light degrees of alcohol, is premature ripening of the grape in warm, dry climates and excess of saccharine in the must. For such wines it seems necessary that the maturing of the fruit should be retarded and the vegetative forces continued until after the heat of summer and the early fall months has passed, and cool weather gradually checks vegetation and slowly develops the saccharine. Grapes so matured attain in the Medoc and on the Rhine their highest qualities with only from 18 to 21 per cent of sugar in the must, and no excess of acid. Fermentation is less violent late in the season, the heat generated is comparatively low, with a corresponding saving of delicate bouquets, and the proper relations between alcoholic strength, acids, and flavors are attained. The same varieties of grapes in warmer and drier climates, unless on very moist, fertile land, come to maturity earlier and, during hot weather, develop saccharine strength from 24 to 28 per cent with proportionate excess of fermentative principles and coarser flavors. More generous wines are the result, and the defects of high alcoholic fermentations are shown. Such wines may have, when young, great promise, and may often be preserved so as to retain natural flavors and bouquets; but they are generally subjected to climatic conditions in cellar and transportation, which destroy their original excellence. They are extremely liable to secondary fermentations and oxidation and often to diseased conditions.

The remedy for such disappointments is in a complete system of fermentation, treatment, and cellar management specially designed to obviate the dangers indicated. Avoidance of crushing the grapes according to usual custom; the use of œno-tannin to regulate the vinous fermentation, prevent disease and precipitate excess of albumen; careful exclusion of the atmosphere, both during and after fermentation; early and complete defecation; careful prevention of all secondary movements, and storage in good cooperage in moist, dark, cool, unventilated cellars, are the principal features of such a system. To produce lighter alcoholic strength some effect may be produced by changing the system of pruning and training, or by reducing the must with water. This latter expedient requires great care and skilled experience, which can only be discussed between practical men, when all the conditions are understood.

In all our best dry wine districts we find great variations of soil, moisture, and exposure. We find that a certain variety of grape develops very unequally in these different locations, as to vigor, fertility, time of ripening, and development of sugar. It is therefore practicable to adopt varieties suitable to conditions, keeping in view the ultimate results desired. There are few vine districts in California where the *Riesling* should be planted as on the Rhine. Here we must place our prolific and late ripening vines on the warm and comparatively sterile slopes, and seek cooler and fresher soils and exposures for the long pruned, small fruiting, and early ripening varieties.

In valleys where it is practicable to ripen and cure the *Muscatel* into raisins, we may look in vain for a site for the Rhenish hocks or the light grades of Medocs.

Each variety of wine grape is well placed when its full maturity,

according to purposes intended, is attained during the declining warmth of the vintage season.

It is not practicable, as some suppose and even advise, to regulate the lightness of wines by the time of picking the fruit. Grapes which become fully ripe very late in the season with low percentage of sugar, will be unfit for wine if picked when they attain the same degree of sugar in a warmer and drier climate, where they naturally become very sweet. Until all the immature acids and other elements are fully developed and the growing vegetation has ceased to force into the fruit fresh undeveloped juices, the grapes are not fit for wine making. With respect to white wines this is particularly true, although a slight *verdeur* is permissible in clarets.

Sherry Taste in White Wines; Rancio and False Acids in Clarets.—. White wines of California, which remain long in ordinary country cellars, especially of the early ripening varieties, rapidly take on a flavor called the sherry taste, unless skillfully managed. This is due primarily to spring fermentations which develop the sherry ferments, and, secondarily, to continuous evaporation and oxidation. This is not theory any longer; I have positively demonstrated it by experimenting with oxygen introduced into bottles to determine its influence. Those who wish to satisfy themselves on this subject have only to take different kinds of wine, introduce a little peroxide of hydrogen, submit the samples to a temperature of about 110° F. for one or two days, and then let the bottles rest a week under normal conditions. They will observe a peculiar acid development in those which contain sugar, even in small unnoticeable degrees, a peculiar flavor as of burnt sugar, and a rapid deterioration of natural colors, together with a loss of original natural fruit flavors. The *rancio* of red wines, dry or sweet, becomes very prominent, and, after tasting, the headiness peculiar to wines from hot dry climates is easily perceived.

Those who sulphur their casks freely (burning sulphur to produce sulphurous fumes) to prevent diseases and fermentative movements, will observe either no trouble of this sort, or at least very little. This is because the sulphurous fumes are opposed to oxygen and prevent its action upon the constituents of the wine. Those who precipitate the albumen, while the wines are young, find little alterations. The presence of nitrogenous elements in wine is like so-called malaria in the system; it provokes many sorts of disease and is unwholesome to the consumer. In connection with heat and oxygen, albuminous matter completely transforms the natural qualities of fruit juices.

White wines from hot, dry countries, bottled before they have completely defecated, acquire in the bottle after a more or less long time a so-called sherry taste, a disagreeable headiness, and generally a positive indication of aldehyde. Our ordinary clarets show these changes less than the whites after long bottling, because they generally contain less albumen on account of the tannin from the seeds and skins, which more rapidly defecates them before bottling. If, however, they have been kept too long in wood they take on a disagreeable *rancio*, lose their freshness, color, and bouquet, and acquire a peculiar, unpleasant acidity.

True Sherry Development.—The so-called sherry taste, as above referred to, is very greatly increased and hastened by subjecting white,

or even red wines, to a high temperature in specially arranged baking houses, called here "sherry houses." Such wines, suitably fortified and agreeably sweetened, are the ordinary sherries, Malagas, and Madeiras of trade, and may be used to blend with young ports to give the appearance of age. The distinctive age flavor of sweet wines of this class, is that of Madeira and not of true port; it is, however, much liked in Eastern markets, but not in England.

The peculiar qualities of genuine natural Spanish sherry are, however, not even approximated by such methods. The natural sherries do not acquire the baked caramel flavors, nor the *rancio* of oxidized saccharine and tannic principles. They owe their most valued qualities to the direct action of a peculiar secondary fermentation, which has never been satisfactorily explained by science. I believe that I have made some progress in studying this phenomenon, and that it may be practicable in California to conduct sherry fermentations systematically. I am not, however, sufficiently satisfied with experiments to discuss this question fully. Many speak of their natural sherries without a proper comprehension of the terms they use. Wines which have kept well in ullage in warm, dry places, avoided acetic action, become old, brown, and more or less oxidized without the intervention of the specific fermentation of sherry, are little more than slowly developed, baked sherries.

That we have the true sherry ferments very often in our new white wines during the summer following fermentation, is very apparent, but if such wines are left with access of air in cool, moist cellars, they rapidly change to vinegar; and if in dry, warm places, they either become foul or the sherry movement is feeble and ceases. We have an imperfect development sufficiently pronounced to encourage careful study of the laws which should govern better results.

Fine Brandies.—To produce fine brandies we need only the carefully distilled sound young white wines, fermented from grapes which contain fragrant odors, greenish acids, and low percentages of sugar. Such wines should never be suffered to ferment with the skins. The *Folle Blanche*, *Colombar*, and all the family of sauterne varieties, when grown where they do not show high sugar percentages, produce the exquisite and delicate flavors and bouquet peculiar to the high types of natural cognacs. The distillates experimentally produced by the State Viticultural Commission, eight years ago, have demonstrated our possibilities in this line beyond question. One thing is, however, remarkable: samples preserved in wood have acquired coarse flavors not found in those preserved in glass jars with access of air.

I am quite convinced that the fine brandies of the future will be so preserved that the coarse wood flavors shall not injure them. If the conventional color is required it will be better to impart it by means of caramel than by a decoction of oak. Cooperage can be easily prepared so as to prevent the wood taint, and sufficient air admitted to favor oxidation.

Experiment has proved to my satisfaction that a reduction of the first run of brandy by addition of water to about twenty-five degrees and careful redistillation will always improve the quality.

Special Rules of Practice.—After carefully considering principles, it is comparatively easy to invent rules of practice, provided the pro-

ducer has clearly in view the objects to be attained. This occasion does not permit me to enter into such details. Our industry has not yet settled down to a fixed policy, and special rules are for amateurs at present.

How to improve our ordinary stocks so as to present them direct from the vineyard in light, agreeable, wholesome, and merchantable condition is the greatest present economic question. This, however, is in abeyance so long as the agitation of a plan to place the control of our products under a huge trust, demanding the highest degree of alcoholic strength as raw material to be worked over, is continued. Wine making on the factory plan I have no desire to study or encourage.

THE LAWS GOVERNING FERMENTATION.—This subject requires special discussion, and will only be referred to here in a few words. The main purpose of the wine maker is to conduct safely the vinous fermentation, which operates to reduce the sugar into alcohol and carbonic acid gas, with some creative effects on other constituents of the must. To favor the vinous ferments, and to prevent others from intervening or succeeding, are his chief cares. The "rule of thumb," varied according to experience, has accomplished a great deal; yet we have a great deal of poor, unsound, badly fermented wine, and much fine new material which is spoiled in keeping.

I shall endeavor to submit several monographs on this subject as opportunity permits.


NO SMOKING
BUILDING

PART II.

CALIFORNIA WINES AT THE WORLD'S COLUMBIAN EXPOSITION.

The display of wines of California, so far as outward show was concerned, was sufficiently varied and extensive, and in some respects effective. The lack of general harmony of arrangement was noticeable. The competitive exhibits were in the Horticultural Building. In a collective sense they attracted much public attention. There were, however, no facilities afforded for general sampling, such as the occasion demanded.

The methods prescribed for the wine jurors and the departure from usual custom in awarding medals were very unsatisfactory to both American and foreign exhibitors. No jurors were appointed from the countries recognized as arbiters of good taste excepting Germany, whose representatives were directly interested in the management of their own exhibits and ignored the American products with a disdain scarcely veiled by ordinary courtesy. The jury was not permitted to assemble and perfect its organization, but was arbitrarily placed under the direction of a few foreign representatives before the American jurors were assembled. Awards to foreign sections were practically determined by their own managers. The American jurors worked faithfully and conscientiously in the American section, but were greatly embarrassed by the stupid rules under which they were compelled to act and the want of any proper management of samples submitted. A few of these gentlemen were competent, but many were entirely disqualified as experts. These latter received their compensation without rendering any service of practical value. Great Britain and France had no representatives, notwithstanding the latter country had sent specially qualified experts for all the separate departments. The French experts made a study of such samples as they could obtain from some of our representatives, but were not enabled to see some of the most important.

Fortunately for California, the most practical American jurors kept together during the examination of our wines, and the report was made by a gentleman, Mr. E. Dubois, of Florida, who is an accomplished connoisseur. As there was not permitted to be any distinctions among medals, a bronze being awarded to all alike worthy of mention, the report is the only result of any value. The medals, all of one kind, are too numerous to be considered prizes of distinction. As a matter of history, bearing upon the practical possibilities of our vintages, I give his report in full, as follows:

REPORT ON CALIFORNIA WINES AND BRANDIES.

By E. Dubois, member of the International Wine Jury at the World's Columbian Exposition, Chicago, 1893.

November 25, 1893.

To Hon. E. Dupuy de Lome, *Chairman Committee on Wines, Columbian World's Fair, Chicago, Ill.:*

Mr. Chairman: It is with some reluctance that I am undertaking to make a report on the wines of California, not for fear of criticism on the part of the malcontents, but because I am afraid I cannot, in this report, which must necessarily be succinct, do justice to all those who, among the grape growers of that favored State, deserve credit for their incessant efforts to raise the standard of California wines.

The critics have been at work ever since and before your jury commenced its examination; on the system of awards first, on the jurors and their work next.

Articles were sent to the newspapers of California in which the jury were represented as "unfriendly to California wines," and of "an aggressive sort"—condemning all of the white wines with the exception of a few of them. Others complained that the awards were given too freely, and that Californians "when they got through the Fair" would have "a Christmas tree full of medals and diplomas." The perusal of this report will show that both informers of the California papers had very little information as to the number of awards given.

Owing to the late date the jurors were summoned to Chicago, the lack of a suitable place for the storage of the California wines, and also, to all appearances, as shown by the dryness of the cork, to the bottles having been kept standing too long, many samples were found out of condition, especially white wines and Burgundies. Even some Sherries and Ports were pricked, which could have been brought about only by a long exposure to the air, although it shows also that these wines were deficient in alcoholic strength.

Most of the Burgundies found to be unsound had fermented in the bottles, and so had a few clarets and Cabernets of the recent vintages, which is especially to be regretted, as, in general, sound samples of the youngest wines showed a marked improvement upon those of old vintages.

With the knowledge California wine makers have of the respective merits of the different grapes, it is a matter of surprise to your jury that many still persist in using a single grape in the manufacture of each wine, and presenting this wine to the public under the name of that particular grape. The Cabernet wine will generally have body, vinosity, and bouquet, but lack that velvety softness of the Merlot wine; the latter will be deficient in body and roundness, and the Malbec found wanting in body and bouquet. Now by the mixture of these three varieties of grapes, a wine could be produced combining fullness of body, softness, and delicacy of bouquet. The same remarks apply to white wines. When a party grows Semillon and Sauvignon Vert, what is the reason for making two sorts of wine instead of one? We take, for example, Mr. F. W. Billings' Sauvigon Vert and Semillon wines, both awarded; the former as good, full bodied wine, with pleasant flavor, the latter as good, light wine, with nice bouquet, both certainly meritorious wines, but one a little too heavy, while the other is wanting in body. The mixture of the two grapes would have corrected the defect of each and resulted in a perfect wine.

The exhibitors of California wines and brandies who entered their wines for competition numbered 53, and the samples submitted to the jury, 348, divided as follows between the different classes, viz.: Class 126, white wines, 127; Class 127, red wines, clarets, Zinfandel, Burgundies, 93. For want of a better classification, all strong wines, dry and sweet, such as Malaga, Tokay, Muscat, Angelica, etc., were included in Class 128 with Sherries, Madeira, Port, and with the latter numbered 108.

By the way, we can't help remarking that the party who devised this queer classification of the wines of the world did not seem to have any idea that besides Sherry, Madeira, and Port, there are other types of wine produced in France, Italy, Greece, Turkey, Austria, Chile, Cape of Good Hope, California, and even Spain and Portugal, known as Tokay, Muscat, Marsala, Malaga, etc.

We would like also to know why, after having comprised in Class 127 red wines, clarets, and Burgundies, he thought of specifying Zinfandel. Is Zinfandel a more special grape than Barolo, Barbera, Mataro, and many others? These anomalies in the classification caused many wines to be entered in the wrong class, as we shall point out when reporting on these wines.

The 117 samples in Class 126 were exhibited by 41 parties, and consisted of 37 Riesling and Hock, 9 of which were awarded; 10 Chablis and others of the white Burgundy type, with 5 awards; 42 Sauternes type, with 14 awards, and 28 samples of different other kinds, with 7 awards; the total number of wines awarded in that class being 35 from 22 exhibitors.

As an examination of the list of awards will show, the best Reisling wines were exhibited by Jacob Schram, of St. Helena, H. W. Crabb, of Oakville, and C. Carpy & Co., of San Francisco; the best wine of the Sauterne type by C. A. Wetmore, of Livermore, C. P. Howes, of Mountain View, J. Crellin & Son, of Livermore, and C. Carpy & Co.; the best Chablis by H. W. Crabb.

In Class 127 the 93 samples were entered by 40 exhibitors, and comprised 43 clarets and

Bordeaux types of different denominations. Here the name is very little indication of the nature of the wine, for while some houses present their best blend of Bordeaux grapes as claret, the claret of other houses is their cheapest blend, being quoted even lower than Zinfandel.

Be as it may, 34 samples out of 43 were deemed worthy of awards, and this proportion shows the degree of perfection already attained in the production of red table wines in California. Among the choice samples exhibited, the following wines received the most favorable mention: Haraszthy, Chateau d'Orleans, Chateau Gundlach, Wetmore's Margaux Souvenir, and the Cupertino Wine Co.'s collection of clarets of different vintages from the finest Bordeaux grapes, the vintage of 1892 being of especially high character.

As to the Burgundies, they were rather disappointing; many samples had spoiled, others had not the slightest similarity to any of the wines known by that name, and only 7 out of 32 were found deserving recognition. A superb wine of great body, roundness, and flavor, labeled Chambertin, was exhibited by J. Gundlach & Co., of San Francisco, while H. W. Crabb presented a remarkable wine of the Hermitage type, with good firmness and softness combined, together with a most delicate purity of aroma; also a robust, full-bodied, round wine of the Burgundy type.

Seventeen samples of Zinfandel carried 7 awards, and while none was of a very high grade, a sample from J. P. Smith, of Livermore, showed great body and finesse.

Among the 11 samples of different other types of wines, 3 were awarded, the most eulogistic mention being for 2 samples from the Italian-Swiss Colony, namely: a Barbera of great finesse, body, and mellowness, and a Tipo Chianti, of remarkable vinosity and roundness. To sum up, out of 93 samples in Class 127, 51, contributed by 29 exhibitors, were awarded.

In Class 128, 108 samples were examined, and 41 reported for awards, viz.: 7 out of 14 samples of Angelica, 11 out of 25 samples of Sherry, 10 out of 28 samples of Port, 1 out of 6 samples of Madeira, 3 out of 4 samples of Malaga, 5 out of 19 samples of Muscat, 3 out of 8 samples of Tokay, and 1 out of 4 samples of other wines. Most prominent in that class were the following wines: An excellent old Port and a fine old Sherry from L. J. Rose & Co., San Gabriel; a very good old Port and a very fine old Muscat from the Eisen Vineyard Co., of Fresno, and also a fine old Port from Stern & Sons, of Los Angeles.

In Class 129, sparkling wines, 6 samples were entered by 3 exhibitors, 2 of whom were awarded for 5 of these samples, Haraszthy Brut being found of surprising clean taste, great delicacy of flavor, and pronounced excellent.

For brandies, Class 131, the number of exhibitors who entered their products for competition was 24, some with several samples of different vintages.

The grade of California brandy is steadily improving, and a vast field is open before the distillers of that State. They must, however, bear in mind that it is only by the purity of their article, and the discriminate use of the right sort of wines for distillation that they can overcome the prejudice attached to all our domestic products, and have their pure, well-distilled, and well-matured brandies take the place in our market of those aromatized spirits, blends, branded with the names of fictitious houses, and sold under the fallacious appellation of Cognac.

Let our California brandy merchants drive all these bogus houses out of the markets of England and Australia, which are the largest brandy markets in the world.

Some of the samples submitted to the examination of the jury showed remarkably clean taste and delicacy of bouquet, without the least earthy taste. Others were of a more stout character, with less refined flavor, but having acquired great ripeness and mellowness from age, which renders them very acceptable, and worthy of being called good old brandies. A fine collection of different vintages was presented by Geo. West & Son, of Stockton.

After having read this report, and perused the list of awards, our California friends will be convinced that the jury was neither aggressive nor unfriendly, and that, if the Christmas tree does not break down under the load of medals and diplomas, all wines and brandies deserving of praise received recognition at our hands.

Submitting the present to your approbation, I am, Mr. Chairman,

Respectfully,

E. DUBOIS.

CALIFORNIA WINES.

List of Awards as Approved by the Committee on Wines and before it was cut down by Mr. John Boyd Thacher.

Class 126.

J. L. Beard, Warm Springs.
Golden Chasselas—Very fine Chasselas wines.

Ben Lomond & Co., San Francisco.
Riesling and White Burgundy—Good, sound wines with agreeable bouquet.

F. W. Billings, Redwood City.
Sauvignon Vert—Full-bodied wine with pleasant flavor.
Traminer—Good, sound wine with pleasant bouquet.
Semillon—Light and nice flavored wines.

Beringer Bros., St. Helena.
Riesling—Good body, fine flavor and bouquet.

C. Carpy & Co., San Francisco.
Sauternes—Very smooth, pleasant wine, with full body and fine Sauterne flavor.
Riesling—Good wine with a great deal of the character of German wine.

J. Crellin & Son, Livermore.
Haut Sauternes—Very good, great body, smoothness, and flavor of French Sauternes.

H. W. Crabb, Oakville.
Riesling—Very good wine of great body and delicacy of flavor, with pleasant bouquet, not unlike that of a good Rhine wine.
Chablis—Good, sound wine, mellow, lightly but pleasantly flavored.

A. G. Chauche, Livermore.
Chablis—Pleasant, light wine.
Jurancon—Good, light wine.

Ewer & Atkinson, Rutherford.
Hock—A light, pleasant wine of agreeable flavor.

J. Gundlach & Co., San Francisco.
Sauternes—A well-developed white wine of fine Sauterne flavor.
Semillon—A light, pleasant wine with delicate aroma.

F. Haesters, Wrights.
Riesling—A good, clean wine.

A. Haraszthy & Co., San Francisco.
Sauternes—Good white wine with a great deal of the character of a French Sauterne.
Chablis—A fair type of Chablis.

C. P. Howes, Mountain View.
Sauternes—Very fine, distinctive Sauterne type.
Riesling—Good, clean wine with light Riesling flavor.

C. P. Johnson, Los Angeles.
Burger—Fairly good type of Burger.

Korbel Bros., San Francisco.
Zernoseck—A good, clean, sound wine.

Napa Valley Wine Co., San Francisco.
El Cerrito—A good, full-bodied wine with agreeable flavor.

Otto Norman, St. Helena.
Gutedel—Good wine with pleasant bouquet.

Jacob Schram, St. Helena.
Hock—Very good wine.
Riesling—Excellent wine, combining body, flavor, and bouquet.

J. P. Smith, Livermore.
Haut Sauterne, 1890—Good.
Haut Sauterne, 1887—Very good.

J. A. Stewart, Santa Cruz.
Haut Sauterne—Good.
White Burgundy—Good.

George West & Son, Stockton.
Haut Sauternes and Sauternes—Good, sound wines.

C. A. Wetmore, Livermore.
Sauternes, Haut Sauternes, and Chateau Yquem—A collection of fine, white wines of high grade Sauterne type.

Class 127.

F. Albertz, Cloverdale.
Claret—Light, clean wine.

Beringer Bros., St. Helena.
Claret—Good, round wine with good body and softness.

J. Crellin & Son, Livermore.
Claret—Good wine with agreeable light bouquet.

C. Carpy & Co., San Francisco.
Claret—Good, sound, clean wine with sufficient body and delicate flavor.

A. Brun & Co., Oakville.
Claret—Good.

H. W. Crabb, Oakville.
Hermitage—A full-bodied, mellow wine with delicate bouquet.
Burgundy—A wine of great body, roundness, and delicacy of aroma.
Claret—A good, sound wine, tender and pleasant.

Cupertino Wine Co., Mountain View.
Claret, 1892, 1891, 1890, 1889, 1886—A collection of excellent red wines of the Medoc type.

R. Delafield, Calistoga.
Claret—Fair clean wine.
Burgundy—Good.

I. De Turk, Santa Rosa.
Zinfandel—Good, sound table wine.
Burgundy—Good body and roundness.
Cabernet—Good, full-bodied wine with pleasant bouquet.

M. M. Estee, Napa.
Cabernet—A wine with good body and agreeable flavor.

E. E. Goodrich, Santa Clara.
Cabernet—A very good, full-bodied wine of great mellowness.
Carignan—A nice tender wine with delicate flavor.

J. Gundlach & Co., San Francisco.
Chateau Gundlach—Excellent Bordeaux type; rich, mellow, with nice flavor.
Chambertin—A full-bodied round wine, deep in color and of a great delicacy of aroma.
Cabernet—A wine of good body and great vinosity.

C. P. Howes, Mountain View.
Claret—A good table wine.
Cabernet—A wine with body and finesse.

A. Haraszthy & Co., San Francisco.
Chateau d'Orleans (claret)—Excellent wine of great body, mellowness, vinosity, and finesse of bouquet.
Cabernelle—Good mellow wine with delicate flavor.

Italian-Swiss Colony, Asti.
Barbera—Very good mellow wine of great body and finesse.
Tipo Chianti—Wine with remarkable vinosity and roundness.
Zinfandel—Good, sound, clean wine.
Mataro—Wine with good body and softness.

H. Lefranc, San José.
Claret—Wine with good body.

C. C. McIver, San José.
Cabernet—Good.
Zinfandel—Good Zinfandel with body and nice flavor.

J. C. Merithew, Cupertino.
Cabernet—Good wine with body and flavor.

G. Migliavacca, Napa.
Zinfandel, Claret—Both good table wines.

Napa Valley Wine Co., San Francisco.
Burgundy—A good, full-bodied wine with pleasant flavor.
Claret—A good round wine.

Otto Norman, St. Helena.
Cabernet—A wine with good body and pleasant flavor.

Wm. Palmtag, Hollister.
Cabernet—Fair wine with body and flavor.

T. Parrott, St. Helena.
Medoc—Good wine of the Medoc type with delicate, pleasant flavor.

Jacob Schram, St. Helena.
Claret—A good table claret.

J. P. Smith, Livermore.
Malbec, Cabernet, Zinfandel, and Claret—A collection of good red wines.

H. B. Wagoner, Livermore.
Claret, Zinfandel—Fairly good.

George West & Son, Stockton.
Claret—Good, clean claret wines of different vintages.

C. A. Wetmore, Livermore.
Claret—Three grades of red wines of Medoc type of superior quality, especially his Margaux Souvenir, which was considered excellent.

Louis Zierngibl, St. Helena.
Carbernet—Good, clean wine with pleasant flavor.
Burgundy, Zinfandel, Carignan—Fair wines with clean flavor.

Class 128.

F. Albertz, Cloverdale.
Sherry—Well matured wine, Sherry type.
Angelica—Good grade of Angelica.
Malaga—Good wine of the dark Malaga type.

Beringer Bros., St. Helena.
Old Port—Old Port with delicate flavor and good bouquet.
Angelica—Rich in flavor and very good.
Muscat—Good Muscat with pleasant flavor and bouquet.

C. Carpy & Co., San Francisco.
Sherry—Good, well matured wine with pronounced nutty flavor.
Port—Old wine of the Port type, mellow and with nice flavor.

H. W. Crabb, Oakville.
Port—Very good old wine, Port type.
Malaga—Fairly good wine, Malaga type.
Tokay—Fairly good Tokay wine.

I. De Turk, Santa Rosa.
Sherry—Good, mellow wine with pleasant flavor.

Eisen Vineyard Co., Fresno.
Port—Very good old wine of the Port type, clean in taste, mellow and of very agreeable flavor.
Muscat—Very good old Muscat, mellow, luscious, and highly flavored.

J. Gundlach & Co., San Francisco.
Sherry—Good, mellow, well matured wine of Sherry type, with nice bouquet.
Tokay—Fine, delicate Tokay, with very pleasant flavor.

A. Haraszthy & Co., San Francisco.
Muscat—Good mellow wine, with delicate flavor.
Malaga, Madeira—Fair types of Malaga and Madeira wines.

Italian-Swiss Colony, Asti.
Angelica—Fair sweet wine.

Margherita Vineyard, Fresno.
Sherry—Light, clean wine, Sherry type.
Port—Good, mellow wine, Port type.

C. C. McIver, San José.
Port—Good, well matured wine.

J. C. Merithew, Cupertino.
Port—Good, full-bodied wine, Port type.
Sherry—Mellow, agreeable wine, Sherry type.

Napa Valley Wine Co., San Francisco.
Port—Good, mellow wine, Port type.
Angelica—Pleasant, sweet wine, delicate flavor.

L. J. Rose & Co., San Gabriel.
Port—Excellent wine, Port type, well matured, mellow, and of fine flavor.
Sherry—Fine wine, Sherry type, well ripened, and with agreeable nutty flavor.

J. P. Smith, Livermore.
Tokay—A fine wine highly flavored.
Angelica—A good grade of Angelica.

Stern & Sons, Los Angeles.
Sherry—Full-bodied, mellow wine, Sherry type.
Port—Fine old wine, well matured, with full body and nice flavor.
Angelica—Good sweet wine nicely flavored.

St. Hubert Vineyard, Fresno.
Port—Good, well matured wine, Port type.

George West & Son., Stockton.
Sherry—Good, well matured wine.
Port—Light, well matured wine.
Fontignan—Good smooth wine, light but delicate flavor.

Louis Zierngibl, St. Helena.
Angelica—Fine, mellow wine, clean flavor, delicate bouquet.
Muscat—Good, sweet wine, with delicate flavor and bouquet.
Port—Good mellow, well flavored wine, Port type.

CLASS 129.

A. Haraszthy & Co., San Francisco.
Champagne, Brut—Excellent.
Champagne, Dry; Champagne, Carte Blanche—Good.

H. Lefranc, San José.
Champagne, Dry—Very good.
Champagne, Special—Good.

CLASS 131.

F. Albertz, Cloverdale.
Brandy—New brandy of fair quality and clean, pure flavor.

Barton Estate, Fresno.
Brandy—Good, well distilled brandy.

C. Carpy & Co., San Francisco.
Brandy—Good, clean taste brandy with delicate bouquet and flavor.

I. De Turk, Santa Rosa.
Brandy—Well ripened and smooth old brandy.

Mr. Chas. F. Oldham.

Mrs. Chas. F. Oldham.

Ewer & Atkinson, Rutherford.
Brandies—Good collection of new brandies.

H. Lefranc, San José.
Brandy—Fine brandy with delicate flavor and bouquet.

G. Migliavacca, Napa.
Brandy—New brandy of fair quality.

Napa Valley Wine Co., San Francisco.
Brandies—Two samples of fair brandies.

J. P. Smith, Livermore.
Brandy—Fine brandy with clean taste and fine flavor.

Stern & Sons, Los Angeles.
Brandy—Good, full, round brandy.

Walden & Co., Geyserville.
Brandy—Good, smooth, old brandy.

H. B. Wagoner, Livermore.
Brandy—Good, sound brandy.

George West & Son, Stockton.
Brandies—Very good brandies, well matured, mellow, with fine Cognac flavor.

P. C. Rossi, San Francisco.
Vermouth—Good, smooth, highly flavored vermouth.

Sanders & Co., San Francisco.
Continuous Still.

CLASS 132.

State Viticultural Commission, San Francisco.
Literature and Statistics of Viticulture.

CLASS 119.

State Viticultural Commission, San Francisco.
Engravings, Photos, etc.

CLASS 120.

State Viticultural Commission, San Francisco.
Method of Vine Growing, etc.

SPECIAL REPORT OF A BRITISH EXPERT.

Acting in accordance with instructions from the State Viticultural Commission of California, specially approved by his Excellency Governor H. H. Markham, I visited the World's Columbian Exposition with the purpose of securing, if possible, critical reports on our wines and brandies from special experts of Great Britain, France, and other countries not represented on the wine jury. Unfortunately, it was too late to appeal to the French experts, who had already departed, excepting Mons. Gos, who was delegated to visit our vineyards and report upon our methods of culture and vinification.

I called upon the British Royal Commission, which was truly a distinguished body, being the Council of the Society of Arts of England. Our request was courteously received and considered favorably. Mr. Charles F. Oldham, a well-known London wine merchant, was appointed to make a full examination of all our samples, and to report to the Royal Commission. A copy of his report, kindly sent to me by Sir Henry Truman Wood, Secretary of the Commission, is given in full below.

Mr. Oldham received and examined duplicates of all the samples, which had been reserved for the International Jury. He had this advantage, however: these duplicates had rested quietly in one place and had recovered somewhat from the effects of heat and transportation, which, together with irregular handling, had interfered with the work of the jury.

Mr. Oldham was accompanied by his wife on his visit to Chicago, and it is because she is inseparably connected with his tours of study and inspection in wine countries that I have photographs of both Mr. and Mrs. Oldham for the illustrations of my report:

REPORT ON CALIFORNIA WINES AND BRANDIES EXHIBITED AT THE WORLD'S COLUMBIAN EXPOSITION, CHICAGO, U. S. A., 1893.

Examined and reported on by CHAS. F. OLDHAM, member of the firm of Grierson, Oldham & Co., 11 Regent Street, London, Eng., at the request of the British Royal Commission.

WINES AND BRANDIES SUBMITTED FOR EXAMINATION.

Three hundred and seventy samples, comprising products from fifty-three different individuals and firms, classified as follows:

Dry White Wines—
- 64 samples described as of Rhenish type.
- 48 samples described as of Sauterne type.
- 11 samples described as of White Burgundy type.
- 6 samples, miscellaneous of various styles.

Dry Red Wines—
- 30 samples described as of Medoc type.
- 24 samples described as of Burgundy type.
- 53 samples, miscellaneous clarets of various styles.

Sweet or Fortified Wines—
- 29 samples described as of Port type.
- 20 samples described as of Sherry type.
- 39 samples, miscellaneous of various styles.

Sparkling Wines—
- 5 samples described as fermented in bottle, according to the French methods of champagne making.

Brandies—
- 41 samples of various makes and ages.

GENERAL CHARACTERISTICS.

The heads enumerated are those requested to be reported on.

1. *Evidences of Purity.*—From careful examination, I feel convinced that all the samples submitted to me were perfectly pure juice of the grape, fermented or distilled in a legitimate manner, without the use of foreign substances, flavors, or essences.

2. *Indications of Intelligent Supervision of the Primary Operations of Fermentation and Distillation.*—I was particularly struck with the excellent manner in which nearly all the white wines have been fermented. One or two, I should say, had been left a little long on their skins, and consequently are somewhat deeper in color than is desirable; but with the exception of these, the fermentations appear to have been excellent. The majority of the red wines show also that they must have been well cared for in this particular.

With regard to the brandies, nearly the whole of them appear to have been well and carefully distilled.

3. *Indications of Methods of Maturing and Preparing for Bottling.*—Most of the white wines have, undoubtedly, been well and carefully matured in wood; but a few, I am led to think, must have been left too long in cask, or kept in a hot or dry cellar, the consequence being they are of rather too deep a color, and have a slightly sherry taste. Probably nearly all those wines were good when first made, and the defects which some of them now show may be attributed to faults in maturing while in wood.

Some of the white wines had evidently an excess of albumen when they were bottled, as evinced by the deposit thrown. A large number were, however, brought into excellent condition for bottling, and have in consequence kept perfectly brilliant.

The maturing in wood of some of the red wines does not appear to me to have been so satisfactory as in the case of the white. Many of the red wines have, no doubt, been carefully matured in good cellars, and in small packages; but others, again, have the appearance of having been kept in large vats, in a hot, uneven temperature. I am induced to think that nearly all the red wines must have been good when young, and probably for a year after, and that the defects now evinced by some of them are due to the want of good, cool, underground cellarage—where an even temperature can be maintained—or to having been kept in large vats, as alluded to above. Undoubtedly, also, a few of the red wines had been left too long in wood before bottling. With these few exceptions, the red wines show great merit, and many of them classified under Medoc types are really very excellent.

4. *Evidence of Skill in Bottling.*—By far the greater majority of the samples submitted showed that great care had been taken in this important particular. In a few cases I found that the dry red and white wines had not been filled up as close to the cork as, in my opinion, is desirable.

5. *Evidence of Critical Knowledge in the Classification of Wines as Shown by Names Adopted to Describe Various Types.*—As a rule, California wine producers seem to have aimed at following the European types as closely as possible, and as they grow European varieties of grapes almost exclusively, they describe their wines accordingly; that is to say, a wine made from Sauterne grapes is described by them as being of Sauterne type, and so on. In some instances, however, sufficient care does not seem to have been exercised in this matter.

6. *Styles of Bottles, Labels, Etc.*—The European style of bottles has most generally been used; for instance, wines described as of claret type have been put into French claret bottles; Burgundy into the ordinary French Burgundy bottle; Hock into the German Hock bottle, and Sauterne into the white French bottle. Amongst the Port, Sherry, brandy, and sweet types, this uniformity has not been equally maintained. In most instances the bottles have been nicely gotten up, bearing neat, plain labels—capsules being generally used, although in a few cases wax has been put in their place.

I would here remark that it must be borne in mind that these criticisms are based upon standards of quality, such as would, I think, be most likely to find favor in a British market. It is quite probable, however, that in the American markets such criticisms might not at all apply.

I think it right to mention that I was, to some extent, aided in my examination of these wines by the fact that nearly all the wine districts in California are well known to me, and that I have, for some years now, been making a careful study of their products. The wines of California must not be confounded with other American wines made east of the Rocky Mountains, where, I believe, nothing but native vines are grown. In California, owing to the suitable soil and beautiful climate, all the finest European varieties are grown in great perfection, and as they bear there in a very luxuriant manner, there is little temptation to make wine of anything but the juice of the grape. The annual quantity made now is about twenty million gallons. A very much larger amount, however, can be produced when the demand justifies it, as there are still considerable tracts of land suitable for vine culture still unplanted. Owing to the fact that the soil and climate in the best wine districts of California resemble closely those of some of the finest in France, and also that the vines grown there are the same, the wines frequently resemble in many points their well-known European namesakes. Amongst the ordinary and moderate-priced wines, I think there are a large number that are well suited to the English market.

From notes taken as I examined each sample, I select the following, as being, in my opinion, the most worthy of remark and commendation:

RHENISH TYPES.

H. W. Crabb. Riesling.—An excellent light wine, free from acidity, in good condition, well corked and nicely labeled and capsuled.

C. P. Howes. Riesling.—A good style of light Hock, nice light color, in very good condition, well corked, nicely labeled.

F. Haesters. Johannisberg Riesling.—A very pretty light wine, in good condition, no resemblance to Johannisberg Riesling, though so labeled.

Otto Normann. Riesling.—An excellent style of Hock, good bouquet, nice color, well kept; in my opinion the best wine in this class.

T. Parrott. Rhine Wine Type, 1891.—A very pretty wine, nice light color, has been well kept and is in perfect condition. To my mind it is more like a Chablis than a Hock; very well corked.

J. P. Smith. Orleans Riesling, 1887.—Very pretty wine of Chablis type, well kept, good bottle flavor, in excellent condition, although the cork was very badly put in bottle.

Beringer Bros. Riesling.—A pretty wine, good light color, but a little acid for my taste.

Jacob Schram. Hock.—A good, well kept, pleasant wine, but hardly the character of a Hock.

Beringer Bros. Old Hock.—A good wine in excellent condition, nice light color, but in my opinion rather too acid.

Ewer & Atkinson. Hock.—A very good wine, nice color; unfortunately sample was a little "corky."

John Crellin & Sons. Riesling.—A very pretty wine, of Hock type, good light color, soft, smooth, and very pleasant, one of the best in this class.

John Crellin & Sons. Hock.—A very pretty light wine, nice color, excellent.

A. Haraszthy & Co. Gutedel.—A very pretty wine, nice color. (See footnote A.)

Los Gatos and Saratoga Wine Co. Riesling.—A good clean wine of Chablis type.

Wm. Wehner Co. Gutedel.—Good clean wine, nice color.

C. Carpy & Co. Riesling.—Nice clean wine, good color.

H. Lefranc. Riesling.—Very good clean wine, nice color.

Italian-Swiss Agricultural Colony. Burger.—Very light, perfectly clean, an excellent sample of Burger; should be valuable for blending purposes.

SAUTERNE TYPES.

Geo. West & Son. Haut Sauterne.—A good wine of Sauterne style, nice color. (See footnote A.)

Inglenook Vineyard. Sauterne.—A nice wine, but hardly Sauterne character; this sample was not in very good condition.

C. P. Howes. Sauterne.—Very pleasant wine of Sauterne style, good color.

Chauche & Bon. Sauterne.—A very good dry type of Sauterne, nice color.

Los Gatos and Saratoga Wine and Fruit Co. Sauterne.—Very pretty wine indeed, clean and delicate, not quite the Sauterne type, more of a Moselle in style.

J. Crellin & Sons. Sauterne.—Good, clean, delicate, nice color, Sauterne style.

A. Brun & Co. Sauterne.—Good, clean wine, not quite the color or character of Sauterne, rather more like a Chablis, but good as a wine.

H. W. Crabb. Sauterne.—Good, clean wine, nice color, not quite the Sauterne style. This sample was a little flat.

Chauche & Bon. Haut Sauterne.—Very good wine indeed, nice color, good condition.

California Wine Growers' Union. Sauterne.—A very fair, sweet type, good color, not much character, but sample was not in very good condition.

C. Carpy & Co. Sauterne.—Very good wine indeed, nice color, in perfect condition, an excellent type of Sauterne.

Julius P. Smith. Haut Sauterne.—Very good style of wine, color a little too high; more of a fine Chablis than a Sauterne.

J. P. Smith. Haut Sauterne.—Same remarks as apply to the previous sample.

Beringer Bros. Sauterne.—Good, clean, dry wine, nice color, but sample was not in very good condition.

Wm. Wehner. Sauterne.—Very good wine, nice color, Haut Sauterne style.

J. P. Smith. Haut Sauterne, 1891.—Excellent, clean wine, rather too deep color.

I. De Turk. Sauterne.—A very nice wine, but scarcely Sauterne character.

J. Schram. Sauterne.—Good, clean, dry wine, in fine condition, unlike Sauterne; put up in Hock bottle.

California Wine Growers' Union. Sauterne.—A good type of Sauterne, but sample was in very cloudy condition.

Italian-Swiss Agricultural Colony. Sauvignon.—Good, clean, well-made wine, adapted for blending.

F. W. Billing. Sauvignon Vert.—Appears to be a straight Sauvignon Vert, clean and sound, a little bitter, only fit for blending.

J. Schram. Sauvignon Vert.—A good, clean sample of Sauvignon Vert, in perfect condition, only fit for blending.

WHITE BURGUNDY TYPES.

Italian-Swiss Agricultural Colony. Chablis.—A pretty light, delicate wine, in perfec condition.

C. C. McIver. Chablis.—A nice wine, good color.

H. W. Crabb. Chablis.—A good, delicate wine, nice color; put up in a Hock bottle.

Italian-Swiss Agricultural Colony. Pinot Blanc.—A good wine of Chablis type, well made and kept in very good condition.

T. Parrott. White Burgundy, Montrachet type.—A good wine, but sample was in very bad condition.

Dr. J. A. Stewart. White Burgundy, 1891.—A very clean, pretty wine, in excellent condition.

Chauche & Bon. Chablis.—Good, clean wine, in fine condition, nice color, considerable flavor and bouquet.

MISCELLANEOUS DRY WHITE WINES.

Italian-Swiss Agricultural Colony. Chasselas.—Good, clean, sound wine.

J. L. Beard. Golden Chasselas.—Very good wine indeed, in perfect condition.

Italian-Swiss Agricultural Colony. Pinot Gris.—Good, sound, well made wine, in excellent condition; the cork too soft.

Chauche & Bon. Jurancon.—Splendid wine, very fine bouquet and flavor, in perfect condition; the finest type of white wine in the whole exhibit.

Italian-Swiss Agricultural Colony. Dry Muscatel.—A pretty light wine, but very little taste of Muscatel.

MISCELLANEOUS CLARET TYPES.

A. Brun & Co. Zinfandel.—A good, clean, well kept Zinfandel.

John Crellin & Sons. Zinfandel.—A good, sound Zinfandel, in fine condition, good color; there is a little bitterness in this wine, but that will probably disappear with age in bottle.

Los Gatos and Saratoga Wine and Fruit Company. Zinfandel.—A good, sound, clean, delicate wine, in excellent condition.

H. B. Wagoner. Zinfandel.—Good color, fine condition. (See footnote B.)

Otto Norman. Zinfandel.—Good, sound wine, nice color. (See footnote B.)

A—Casks too heavily sulphured.

H. W. Crabb. Zinfandel.—Good wine, soft and smooth, apparently has been well and largely blended with some other variety.

I. De Turk. Zinfandel.—Good, soft, smooth wine, nice color, in first rate condition, labeled "Zinfandel," but tastes as though blended with some other variety and improved by the blend.

Julius P. Smith. Zinfandel, 1891.—A very good sample of Zinfandel, delicate, and free from acidity.

Italian-Swiss Agricultural Colony. Good, sound, full bodied wine. (See footnote B.)

G. Migliavacca. Zinfandel, 1886.—A very good, firm wine, deep color, soft and smooth, in first rate condition; has no resemblance to Zinfandel.

Italian-Swiss Agricultural Colony. Mataro.—A very good sound, well made wine, nice color, perfect condition, very agreeable style.

F. W. Billing. Mondeuse. 1890.—A very good, soft, agreeable wine; should blend well with Zinfandel.

Los Gatos and Saratoga Wine and Fruit Co. Claret XX.—Good, clean, light wine, nice color, good condition, very pretty style.

E. E. Goodrich. Table wine.—Good, sound, heavy wine, deep color.

H. B. Wagoner. XX Claret.—A big, heavy wine with deep color, rather pronounced flavor.

H. W. Crabb. Claret.—A nice delicate wine, perfect color and condition, but a little too acid.

J. Crellin & Sons. Claret.—Good wine, nice color, perfect condition, very agreeable in spite of a little bitter or tannin taste.

Inglenook Vineyard. Claret, 1882.—A nice wine, good color and condition, not very much character.

G. Migliavacca. Claret.—A good, sound, deep color and condition, with considerable body, soft and smooth, but rather too heavy.

F. Albertz. Chau Moulton.—Very pretty light wine, in good condition, nice light color.

Chauche & Bon. Table Claret.—Very fair wine, nice color, good condition.

J. P. Smith. Claret, 1890.—Very good, soft, smooth, full-bodied, good color and condition.

Geo. West & Son. Claret, 1888.—Very fair wine, nice color, good condition.

Geo. West & Son. Claret, 1887.—Good, clean, well made wine, nice color, in excellent condition.

Beringer Bros. Claret.—Good, light wine, nice color, fine condition, just a little bitter taste.

Chauche & Bon. Claret, Grand Vin.—Good, sound, light wine, in perfect condition, but tastes a little "stalky."

Italian-Swiss Agricultural Colony. Barbera.—Big, rich wine, soft and smooth, very good, though sample was not quite bright.

E. E. Goodrich. Claret Carignan.—A good, clean, fairly light wine.

MEDOC TYPES.

J. Gundlach & Co. Chateau Gundlach.—Excellent wine, in fine condition, soft and smooth, good color, full bodied.

C. Carpy & Co. La Loma.—Very good, soft, smooth wine, nice color, free from acidity; an excellent full-bodied wine, with rather pronounced flavor.

John T. Doyle. Claret, 1886.—An excellent wine, of good style, nice light color, in perfect condition; more breed in this wine than in any other red wine exhibited.

John T. Doyle. Claret, 1887.—Same style wine as above, but not as well kept, rather too acid.

C. C. McIver. Cabernet.—Very good, rather heavy, in excellent condition. If well kept should develop into a fine wine, but will take some considerable time to come to perfection. (See footnote B.)

C. P. Howes. Cabernet.—A straight sample of Cabernet Sauvignon, very big, useful for blending.

J. Gundlach & Co. Cabernet Sauvignon.—A very fine wine indeed, in perfect condition. A little too big for some people.

Napa Valley Wine Company. Cabernet.—Very pretty style of wine, not as heavy as some, good color and condition, clean, but just a little "stalky."

J. P. Smith. Cabernet, 1890.—A very fine wine in excellent condition, nice color, not too heavy.

Otto Norman. Cabernet Sauvignon.—Very good wine, in excellent condition; should develop into fine wine, but very heavy indeed.

T. Parrott. Medoc, Chateau Margaux Type.—A fine, big, straight Cabernet Sauvignon; will probably take a long time to come to perfection; intrinsically a very fine wine, but in my opinion too heavy as it is.

Arpad Haraszthy & Co. Chateau d'Orleans.—A fine, good style of wine, fit for present drinking, should go on improving in bottle.

J. P. Smith. Malbec, 1886.—A good wine for blending purposes, has a fine bouquet, but a slight acid taste.

E. R. Lilienthal & Co. Medoc, 1890.—A very pretty wine of lighter style than many, good bouquet. The sample was a little flat.

B—An excess of tannin.

Napa Valley Wine Company. Cabernet.—Very pretty, light style, good bouquet, fit for present drinking, in good condition.

I. De Turk. Cabernet, 1891.—A beautiful soft wine, with nice bouquet, in perfect condition; should develop into a fine wine, though a little heavy.

Arpad Haraszthy & Co. Cabernet Blend.—Good style of wine, nice bouquet, in perfect condition.

Dr. J. S. Stewart. Haut Medoc, 1890.—A fine sample of Cabernet Sauvignon, in good condition, very heavy.

Dr. J. S. Stewart. Haut Medoc, 1891.—Same remarks as previous sample.

J. P. Smith. Malbec, 1891.—Very good, full-bodied young wine, in fine condition.

John T. Doyle. Cabernet Franc, 1890.—A very good wine indeed, nice color, perfect condition; should develop beautifully with age in bottle.

BURGUNDY TYPES.

J. Crellin & Sons. Burgundy.—Good, clean, light style, rather dry, in fine condition.

C. C. McIver. Burgundy.—Good, soft, clean wine, in perfect condition, but without much character; in a claret bottle.

I. De Turk. Burgundy.—Very good, smooth wine, in nice condition, very agreeable; in claret bottle.

Chauche & Bon. Burgundy.—A very good, soft, rich wine, in fine condition.

R. H. Delafield. Mataro.—Nice, light wine, good condition.

Los Gatos and Saratoga Wine and Fruit Company. Burgundy.—Good, clean wine, in fine condition.

H. Lefranc. Burgundy.—A very heavy, deep-colored wine, in fine condition, but hardly Burgundy style.

J. Gundlach & Co. Burgundy.—Heavy, rich, deep colored, soft, and free from acidity.

J. P. Smith. Burgundy, 1891.—Good, rich, young wine, in fine condition.

T. Parrott. Chambertin style, 1888.—Very good, full-bodied wine, in perfect condition, well kept.

J. Gundlach & Co. Chambertin.—Very fine, rich wine, good flavor, in splendid condition.

H. W. Crabb. Burgundy.—A nice, clean, light wine, in good condition.

Arpad Haraszthy & Co. Burgundy.—Beautiful color, good bouquet, in very fine condition, but rather too much acid for my taste.

Napa Valley Wine Company. Burgundy.—Fine, rich wine, soft and smooth, in beautiful condition, nice color.

Beringer Bros. Burgundy, 1889.—Good, full wine, in fine condition.

Italian-Swiss Agricultural Colony. Burgundy.—A very pleasant wine, with nice color, and in perfect condition.

BRANDIES.

H. Lefranc. Grape Brandy.—Well made, clean.

T. Parrott. Fine Champagne Type.—A good, clean brandy, with a pronounced aromatic taste and smell.

T. Parrott. Fine Champagne Type, 1890.—Good, clean, pretty brandy; should be very good when old.

W. Palmtag. Brandy.—Nice, clean brandy, well made, but just a little too sweet.

Italian-Swiss Agricultural Colony. Brandy.—A good, pure, young brandy.

C. C. McIver. Brandy.—A good brandy of pleasant style.

J. Gundlach & Co. Grape Brandy.—A very fair brandy of French style.

Los Gatos and Saratoga Wine and Fruit Company. Brandy.—Good, clean brandy.

J. Gundlach & Co. Brandy, 1883.—A good brandy of French style.

J. Gundlach & Co. Brandy, 1882.—Same remarks as above.

Ewer & Atkinson. Brandy, 1891.—A very clean straight brandy, delicate and agreeable.

George West & Son. Brandy, 1890.—Very good style, well made.

George West & Son. Brandy, 1888.—Very good style, well made.

George West & Son. Brandy, 1886.—Very good style, well made, a little too sweet.

George West & Son. Brandy, 1884.—Very good style, well made.

George West & Son. Brandy, 1882.—A good brandy, but a little coarse and high color.

George West & Son. Brandy, 1878.—Good, clean, very dark color.

George West & Son. Brandy, 1876.—A good brandy, but a little coarse.

The brandies of George West & Son show great improvement from 1884 to 1890 over previous years, and, taken as a whole, they are probably the best and most reliable exhibited.

Barton Estate Vineyard Co. Brandy.—A good clean, well-made brandy.

Leland Stanford, Vina. There were nine samples of brandy in this exhibit, ranging from the years 1886 to 1892, and they were all good, well-made brandies, that of 1889 being the best at the present moment, though the succeeding makes will probably, at the same age, be equally good. These samples were all freshly taken from wood, whereas the other exhibits were all bottled goods.

J. P. Smith. Brandy, 1891—Very good, clean, pale brandy.

California State Viticultural Commission. Experimental distillates made in 1886. The grapes were from Livermore Valley, and were fermented without skins by the Commission, in small packages. The wine was distilled in a glass still. The first distillate

was then reduced with water twenty-five per cent, and redistilled. This brandy has been kept in glass packages with perforated covers, so that the brandy is subject to the action of the air, and is of course quite white. The following are the varieties, placed in what I consider the order of merit: 1. Folle Blanche; 2. Blend of Folle Blanche two thirds and Colombar one third; 3. Burger; 4. Mission.

SPARKLING WINE.

Arpad Harazthy & Co. Eclipse Extra Dry.—An excellent wine, of champagne character, very clean and free from acidity; in perfect condition.

Arpad Haraszthy & Co. Eclipse Brut.—A similar wine to the above, but considerably drier.

Arpad Harazthy & Co. Carte Blanche.—A very agreeable, soft, smooth wine.

H. Lefranc. Extra Dry.—A fair wine, not quite bright; had evidently been prepared some considerable time; very "mousseux." This wine had a slight Sherry taste. The bottle was not at all well corked or foiled.

H. Lefranc. Dry.—The same remarks apply to this sample as to the above, except that the wine was considerably brighter.

SHERRY TYPES.

Geo. West & Son. Sherry, 1882.—A very fair, clean wine, unlike the Spanish style, however.

C. C. McIver. Sherry.—Clean, soft wine, somewhat of the Golden Sherry style.

J. Gundlach & Co. Sherry.—A fair, clean wine of Golden Sherry style; not as deep in color, or as sweet as most of the California Sherries exhibited.

I. De Turk. Sherry.—Rather better style, a little lighter and drier than most.

Eisen Vineyard Company. Sherry.—Lighter in color and drier, and rather better style than most.

Cordelia Wine Company. Sherry.—A very pretty style of light, sweet Sherry, soft and smooth, very good of its sort; by far the best exhibited.

There were twenty samples of so-called "California Sherries" exhibited. The majority of them were, however, very poor indeed, and scarcely any bore a resemblance to the Spanish.

PORT TYPES.

J. C. Merithew. Port.—Fair color, and not bad wine of its sort, though no resemblance to Portuguese Port.

Geo. West & Son. Port, 1885.—A clean, light, sweet wine, well made and aged; one of the best exhibited, though unlike Portuguese Port.

Geo. West & Son. Port, 1886.—The same remarks apply as to the previous wine.

J. P. Smith. Port, 1890.—A very fine wine, as a California Port, but no resemblance to Portuguese.

H. W. Crabb. Port, 1888.—Same remarks as previous sample.

Eisen Vineyard Company. Port.—Very fair, clean, light, sweet California Port; has a slight resemblance to Portuguese Port; undoubtedly the best exhibited.

L. J. Rose & Co., Ltd. Port.—A clean, old, sweet wine, with color of Madeira; good of its sort, though no resemblance to Port.

Steinecke & Bruning. Port.—A fair, rich, full-bodied wine.

More than twenty-nine samples of so-called California Port exhibited, but scarcely any of them had the least resemblance to Portuguese Port. They were more like sweet claret.

I am of the opinion that there are certain districts of California which are well suited to the production of Port and Sherry types, and I have no doubt if the same amount of care and study were given to them as has been given to the dry, red, and white wines, they would prove equally satisfactory.

MISCELLANEOUS SWEET WINES.

J. P. Smith. Angelica, 1890.—A good, rich Angelica.

L. Stanford, Vina. Angelica, 1892.—Clean, very good indeed; by far the best exhibited.

Barton Vineyard Company. Angelica.—Very good sample of Angelica.

R. Delafield. Angelica.—Very good, nice flavor, one of the best.

R. Delafield. Muscatel.—Good of its sort, though sample was cloudy.

Steinecke & Bruning. Muscatel.—Good, very sweet.

Italian-Swiss Agricultural Colony. Muscatel.—Good, sweet, though little taste of Muscatel.

H. B. Wagoner. Muscatel.—Good, rich.

Beringer Bros. Muscatel.—Good, clean.

Eisen Vineyard Company. Muscatel, 1876.—Heavy, rich, very good of its sort.

Geo. West & Son. Frontignan.—Rich, with a good deal of flavor.

J. Gundlach & Co. Tokay.—One of the best; light and good.

J. Gundlach & Co. Malaga.—Rich, full wine of Malaga type; good of its sort.

Amongst the Claret and Sauterne types exhibited were several important samples

submitted by Mr. Charles A. Wetmore, but owing to the fact that Mr. Wetmore was appointed by the Viticultural Commission to arrange for this examination, he requested that his samples should not be reported on.

The samples were all tasted without my knowing at the time by whom exhibited. The examination was made by numbers and not by names, the key to them being given me when all "tasting" was finished, in order that I might place comments against the exhibitors' names. Professor Wiley, Chief Chemist of the Agricultural Department of the United States, kindly assisted at the examination.

CHAS. F. OLDHAM.

Having submitted his report to the Royal Commission, by whom it was presented to the Society of Arts, in London, Mr. Oldham was subsequently invited by the society to deliver an address before its members on the subject of California wines.

We are indebted to "Ridley's Wine and Spirit Trade Circular," London, February 12, 1894, for the following notice of Mr. Oldham's lecture:

CALIFORNIA WINES.

(From Ridley's.)

As we have mentioned in another part of our present issue, an interesting paper on Californian wines was read before the Society of Arts on the 31st ult. by Mr. Charles F. Oldham, of Messrs. Grierson, Oldham & Co., Regent Street, W. Want of space unfortunately prevents our publishing the paper in its entirety, and we must therefore content ourselves with quoting the principal points in connection with their production and trade. About the year 1860 we learn the wine industry in California first began to receive attention, but until 1880 it seems to have met with but qualified success.

"There was woeful lack of knowledge, and but a few acknowledged authorities from whom information could be obtained. The State Legislature, recognizing the condition of affairs, created in March, 1880, a State Board of Viticulture, and provided the necessary funds. The State was then divided into seven viticultural districts, each having a representative on the Board—the representatives being chosen from men who were practically conversant with viticulture in all its many branches. Two extra Commissioners were added to represent the State as a whole. These nine Commissioners immediately set to work to gather and distribute all information which was likely to be serviceable to the industry, and in 1881 they issued a report which proved to be of the greatest value. They arranged for a large number of cuttings of the finest European varieties of grapes being imported into and planted in California. Experimental stations were also formed, with the object of determining the sorts which were most likely to succeed in the different districts.

"It is unquestionable that the soil and climate of California are exceptionally well suited for the production of wine, and it is not surprising that, with the improved methods of cultivation and of wine making, the quality of wines rapidly improved, and that men of wealth and experience embarked in the business.

"In 1880 not more than 35,000 acres were under vine cultivation, and of the grapes grown only 20 per cent were of imported varieties, the rest being Mission; whereas in 1888 there were some 150,000 acres of bearing vines, and 90 per cent of these consisted of the finest European varieties. The number of vine growers had by this time increased to some 6,000, with a capital of £13,000,000. In the year 1877 the total amount of wine made in California was 4,000,000 gallons, whereas in 1886 it had increased to 18,000,000, and is now about 20,000,000 gallons per annum.

"Large though this quantity is for a new country, it is comparatively small to what can, and no doubt will, be produced as the demand increases. If the prices for wine show a tendency to advance to any appreciable extent, fresh planting of vineyards will immediately take place, and this will bring up the supply to the level of the demand. For this reason good California wines should be obtainable, at a moderate cost, for many years to come.

"One peculiarity of the viticultural industry in California is that, owing to the diversity of climate, it is possible to make wine of almost every kind. The Coast Range, for a considerable distance north and south of San Francisco, is regarded as perhaps the best part of the State, according to present experience, for the production of natural dry red and white wines, such as those of the claret, Burgundy, Hock, and Sauterne types. This district comprises the counties of Santa Cruz, Santa Clara, Napa, Sonoma, San Mateo, Livermore, etc. Farther south, around Los Angeles, and in some of the hotter parts, such as Fresno, excellent wines of Port, Sherry, and sweet-wine types could be produced. Brandy can also be made in almost any part of the State, as the Folle Blanche grape, formerly so celebrated in the Cognac district of France, grows in California to perfection. The climate in the best dry wine districts of California being very uniform, is exceptionally well adapted for wine cultivation.

"As to climate. That of California is acknowledged to be almost perfect for vine culture, owing to its regularity, and to the bright, sunny weather which can be depended

on from the beginning of June, when the fruit sets, to the close of the vintage in October. With these facts, and the knowledge that the same varieties of grapes are grown in each country, it is only natural to expect that good wine and good brandy can also be made in California, especially as no expense or labor has been spared to obtain the most improved appliances and machinery for the purposes of wine making and distillation.

"A large number of French, German, Italian, and Swiss wine makers have settled in California, and it cannot be doubted but that the experience and training of these men—combined with the wealth, energy, and enterprise of the Americans and English who have made California their home—is having a very marked effect on the wine industry.

"California is far from being the only part of America where wine is produced, some considerable quantity being made in the Eastern States—notably in New York. These wines are, however, of a totally different character, being made entirely from native grapes, no European varieties growing east of the Rocky Mountains. Undoubtedly the best style of wines made in California up to the present time are the natural dry red and white varieties, such as those of the claret, Burgundy, Sauterne, Hock, and Chablis types.

"As has already been stated, these wines are made from the same variety of grapes as in Europe, but in California they develop somewhat different characteristics. For instance, the white wines, made from the Riesling or Hock grapes, although resembling in many respects the German Hocks, have less acidity, and, as a rule, more body. This is owing, no doubt, to the fact that these grapes thoroughly ripen in California.

"Sauterne types, in California, are chiefly made from the Semillon and Sauvignon Blanc varieties, the wines produced being generally very clean and soft, and without any of the excessive sweetness so often found in the fine French Sauternes.

"The Chablis, or White Burgundy types, also succeed very well in California, the wines being delicate and free from acidity. Upon the whole, these three types of white wine are probably the best which are produced in California.

"Of natural dry red wines, the Burgundy types are perhaps the best, having generally a nice ruby color, a good deal of body, and a fine fruity flavor. The Petit Pinot, or Burgundy grape, grows there to perfection.

"Amongst the claret types there are a great many different kinds produoed in California, nearly all the famous Bordeaux grapes being grown there extensively. The Zinfandel grape also makes a Claret type of wine, and, as it bears heavily, the wine made from it is generally obtainable at a moderate price.

"In certain districts this grape produces an agreeable light table wine, soft and smooth. It comes to maturity early, and does not require to be kept in cask or bottle nearly so long as other and finer sorts. Most of the better Claret types are made by the judicious blending of well-known Medoc varieties of grapes. Claret made from the Cabernet Franc grape alone, produces, in certain parts of the State, a fine wine of good color and flavor, with great firmness, developing splendidly with age.

"The Cabernet Sauvignon grape is now grown to a considerable extent in California, and produces a very big, rich wine; but it takes a long time to mature, and is chiefly valuable for blending with lighter sorts, to which it gives great character.

"As regards the sparkling wines of California, there is at present only one firm which has been very successful in dealing with them. Many years and large sums of money have been devoted to making experiments and to bring this wine to its present state of maturity. It has peculiarities of its own, but it is exceedingly clean and free from acidity, and develops well with age.

"Up to the present time the people in California have not given as much care and study to the production of Port and Sherry types as they have to the natural dry red and white wines. There is no reason, however, why—in some parts of the country—they should not succeed equally well with them; and even now it is possible, with care and attention, to obtain some very fair wines of the Port and Sherry types.

"There are several other varieties of sweet wines made in California, some of them being peculiar to the country, for which there is a large demand in America, such as Angelica, Muscat, and Tokay; the latter—though a good wine of its sort—does not closely resemble its Hungarian namesake.

"Undoubtedly one of the most successful of California's productions is its brandy, which is distilled from wine made from the Folle Blanche grape, with a small proportion of Colombar, which thrive in California to perfection, and as they bear abundantly, fine brandy can be made from them in the latter State at a very reasonable price.

"The freight on wine from San Francisco to London is about the same as from Spain or Portugal to London. There are many routes available, the cheapest and most generally used being that of a sailing ship around the Horn, a voyage of about four months. The keeping qualities of these wines are such that they improve by a long voyage. Another route by which large quantities of these wines and brandies are shipped is from San Francisco to Panama by steamer, thence by rail across the Isthmus, and then by steamer again to New York or Europe. This route usually takes from two to three months, and is also very inexpensive. In cases when speed in transit is of the greatest importance, the wines are sent by regular freight trains from San Francisco to New York, a distance of about 4,000 miles, which takes a maximum of ten days. The cost of freight by rail is subject to a good deal of fluctuation, and is dependent upon the competition existing at the time. For a considerable while, however, the rate of freight on wine from San Francisco to New York, by rail, has only been 1¼ d. per gallon.

"Almost invariably the wine-producing countries are large wine-consuming countries,

and California is no exception to this rule. Some 8,000,000 gallons of its own wine are annually consumed in California, whilst the remaining 12,000,000 gallons are sold chiefly to those parts of America where there is a large foreign population—such as New Orleans, New York, etc.—Americans, as a nation, being very small wine drinkers. There is also a continuously growing export trade in California wines all over the world, and ever-increasing quantities are finding their way to England, where they are taking a recognized position, being appreciated by the public for their purity and wholesomeness.

"That California, with its manifold advantages in all these respects, is rapidly taking its place as one of the principal wine-producing countries of the world is undoubted, and it is not surprising to those who know the facts of the case. The sooner these facts become more widely known the more quickly will California wines attain, more especially in this country, the high place in public estimation to which their excellent qualities assuredly entitle them."

A BELGIAN EXPERT ON OUR WINES.

We are indebted to Mr. James D. Phelan, of San Francisco, for the following letter, on a tasting of California wines by a well-known foreign expert:

(Copy.)

CARLE FRERES,
Brussels, Antwerp, Liege, Epernay,
Hautmont, Mayence.

BRUSSELS, March 16, 1894.

CHARLES J. MURPHY, *Esq., Special Representative in Europe, United States Agricultural Department:*

DEAR SIR: I send you in writing my impressions of the samples of California wines that we have tasted together. I cannot base my general opinion on the wines of that country, only those that you have presented me with, and which I consider from said samples as being pure, that is to say, without mixture, and free of any alcoholic admixture.

My opinion is that great progress has been made in a few years in the art of viniculture in California. The dry wines—red and white—have attained equal results that similar wines have in France. The wines are full-bodied and admit of being kept a long time. The only criticism to be made does not directly concern the wines themselves, but the condition of the soil from which they have sprung.

All the products of California, as of those of Spain and Italy, to a great extent have a chief fault, the result of the great richness of the soil, also of its chemical composition the wines are strong of taste and readily affect the head.

The French wines have, on the contrary, a great deal of pungency, and at the same time, an alcoholic strength almost as great. The chemical analysis shows that California wines generally lack that acidity, which fact makes the wines appear fresh, and aids the digestion—above all, tartaric acid.

You might deduce from my remarks that it would suffice to add to California wines a certain quantity of acids—tartaric, citric, or other. This, however, would not be advisable, for you know that acids, in whatever proportion they exist, in the natural state of the wine can be detected by analysis. It would be necessary, in my opinion, to try and have a different result in the cultivation of the vine that would produce a change in its actual state. If this result for certain reasons could not be obtained, then the manner of pressing the grape should be examined into and a process determined on that would produce in the wine this natural acid. For instance, in the picking of the grape in three different periods of its cultivation: First, before its maturity; second, after and during its maturity, so as to make three wines that could be finally blended into one, or perhaps to introduce into the cask of grapes immediately after they have been culled a natural acid that would give freshness to the wine.

But how would this change be effected? It is not the place to here explain or develop this idea, but you can be quite certain that one should not follow the same method of cultivation and of wine making that is generally followed in France.

The cuttings from California that have been planted in all countries of Europe have yielded the best results and will give always better. It is no longer for this rich country a doubtful point, it is only a question to perfect themselves still more in the art of wine making, so that the finest and best results will accrue from her almost too productive soil.

But as to its brandy, it could not be finer or better, for this product is by far superior to the cognacs of Spain.

If California seeks foreign markets for her wine products, I sincerely think that all her efforts should be directed to produce dry wines—red and white—also cognac, leaving the initiatives of Port, Madeira, and Malaga and other products, of which the consumption in comparison is so small to those of dry wines, and are not as healthful, nor as much to be recommended for general use.

You will find added to this report the list of the various wines which I have tested and classified, with my opinion of each as to its merits. Receive, dear sir, my most profound respects.

(Signed:) A. CARLE.

Copy of the opinion given by Carl Freres, of Brussels, on samples of California wines, submitted to him by C. J. Murphy, Special Representative of the United States Agricultural Department in Europe.

Zinfandel—This wine resembles Burgundy, and is rather strong to the taste.

Cabernet—In taste this wine has a striking resemblance to Medoc, is most agreeable to the palate, easy of digestion; makes an agreeable table wine.

Claret—This wine being in a state of fermentation could not be well tested, nevertheless it is of a far inferior quality to Cabernet.

Sauterne—This wine has a very decided bouquet, rather strong to the taste, and not refreshing.

Sauvignon Vert—Bouquet of French wine; the same praise that has been given to Cabernet; a little too strong.

Hock—Taste of superior Rhine wine.

Riesling—Very elegant wine and really fine.

Sherry, Port, Malaga, Angelica—These wines are very difficult of digestion, and are a very poor representation of the wines they are intended to imitate.

Muscat—This wine is very well made, and is deserving of especial praise.

Brandy—The two samples, above all that called Folle Blanche, is perfect.

(Signed:) CARL FRERES.

I am unable to state what and how many samples of our wines were offered by Colonel Murphy to Mr. Carle for examination. I know, however, that many of our best growths were not before him.

In the files of the "Pacific Wine and Spirit Review" there are to be found copies of several important letters from Colonel Murphy, in which confidence in our wines is expressed, after numerous opportunities to place samples before foreign experts. He predicts profitable trade for us with England and some parts of Europe.

PART III.

THE TARIFF AND INTERNAL REVENUE TAXES.

CHANGES IN THE LAW UNDER THE RECENT ACT OF CONGRESS, AND FURTHER AMENDMENTS NEEDED.

It would be useless effort at this time to make any extended report upon the continuous labors which I was called upon to perform on behalf of the State Viticultural Commission, in connection with recent Congressional action on tariff and internal revenue matters. My visits to consult with the California delegation and officers of the Treasury Department occupied my time for six months. Incidentally it was necessary to confer with representatives of wine-producing sections of the Atlantic States, distillers of Kentucky and elsewhere, and especially the organized body of the wine trade of New York, largely interested in foreign products.

Happily I was enabled to secure the most harmonious relations between representatives of all the varied interests, both foreign and domestic, upon a basis of mutual justice, excepting so far as the opposition to the extension of the bonding period for domestic spirits was concerned. In this latter respect the contest was vigorous on both sides, with, however, a successful issue establishing the justice of our demands.

The elimination of controversy between Eastern and Pacific Coast wine makers over the sweet wine law and the union of domestic and foreign wine interests, in behalf of fair specific duties in place of the proposed *ad valorem*, rendered the work of presenting to Congress our just claims comparatively easy. The California delegation, especially our Senators, were greatly assisted by this line of policy, and cordially seconded all our endeavors with signal success.

The gentleman who occupied the leading position in securing harmonious action was Col. Charles McK. Leoser, President of the Wine and Spirit Traders' Society of New York, and proprietor of "Bonfort's Wine and Spirit Circular." To him I was indebted all the time for the most cordial and patriotic assistance. We met together with the intention of coöperation on a basis of justice to all concerned, and at all times were in perfect accord with all whom we represented.

As a matter of history, I here introduce a copy of the card which was used at the banquet given to commemorate our harmonious relations:

Colonel Chas. McK. Leoser.

SOUVENIR BANQUET

To the California Delegation in the Congress of the United States. Welcker's Hotel, January 26, 1894. Given by the New York and California Wine Producers and Dealers to Commemorate the First Amicable Understanding between the Native and Foreign Interests.

Waste not your hour, nor in vain pursuit
Of this or that endeavor and dispute;
Better be jocund with the fruitful grape
Than sadden after none, or bitter, fruit.—*Rubáiyát.*

"I wonder often what the vintners buy
One half so precious as the stuff they sell."—*Rubáiyát.*

White Wine—Haut Sauterne Type (vintage 1886) .... California.
Clarets—St. Julian Medoc Type (vintage 1888) .... California.
Margaux Type (vintage 1887) .... California.
Burgundy—Clos Vougeot (vintage 1868) .... Welcker's.
Sherries—D. G. & Co. "Amontillado" .... Alex. D. Shaw & Co.
D. G. & Co. "Oloroso" .... Alex. D. Shaw & Co.
Madeira—C. G. & Co. "Royal" (vintage 1836) .... Alex. D. Shaw & Co.
Port—O. F. & Co. "Queen Victoria" .... Alex. D. Shaw & Co.
Champagne—Piper Heidsieck, Extra Brut, Magnums .... John Osborne, Son & Co.
Louis Roederer (vintage 1880) .... Alex. D. Shaw & Co.
Louis Roederer, Brut (vintage 1889) .... Alex. D. Shaw & Co.
Louis Roederer, Grand Vin Sec (vintage 1889) .... Alex. D. Shaw & Co.
Cognac—Reynault & Co. (vintage 1848) .... Gourd & Tournade.

The grape that can with logic absolute
The two-and-seventy jarring sects confute;
The sovereign alchemist that in a trice
Life's leaden metal into gold transmute.—*Rubáiyát.*

MENU.

Huitres.

Potages.
Consomme Royal.

Hors d'Œuvres.
Celery, Olives, Radishes, Anchovies.

Poisson.
Filet de Bass a l'Italiene, Cucumber Salad.

Entrees.
Filet Mignon, Sauce Bearnaise; Pommes Duchesse, Stewed Terrapin, Asperges en Branches.

Sorbet au Kirsch.

Roti.
Redhead Duck, Gelée de Grosseille, Salad Celery.

Entremets Sucrés.
Meringue Glacé, Fromage, Fruits, Mendiants, Café.

Owing to the peculiar necessities of the pending legislation, the chief labors in Congress concerning our interests fell to the lot of our Senators, but while it is impossible to praise them too much for their faithful and energetic presentation and advocacy of our just demands, it will always be remembered how effectively our representatives in the other house seconded all their efforts.

I take especial pleasure in offering the illustration from a photograph of Col. Charles McK. Leoser, whose influence has been so much felt. Colonel Leoser, although largely representing the foreign wine trade, is a typical American of the best New York stamp. A graduate of West Point, he served with distinction during the late civil war; as a practical wine merchant, he has had experience; as a journalist, he ranks at the head of our specialists; as a social force, he is known in all the best clubs; and as President of the Wine and Spirit Traders' Society, he is respected and trusted by all. He was the American wine juror at Paris in 1889, and was first in the mind of California producers when it was

hoped that an international wine jury of commanding influence and ability would be organized at Chicago.

I sincerely hope that the harmonious relations first established in January of this year at Washington may continue to mark the policy of the wine trade in America, and that all provincialism, both native and foreign, may forever disappear.

The joint communication, in accordance with which the tariff on still wines in bulk was finally agreed to, is quoted as follows:

THE VIEWS OF AMERICAN PRODUCERS AND IMPORTERS.

WASHINGTON, D. C., January 30, 1894.

To the Secretary of the Treasury:

SIR: We respectfully submit for your consideration the following brief statements tending to show why the proposed *ad valorem* duty on still wines should not be adopted:

First—Under an *ad valorem* tariff all compounds of spirits in imitation of wine, and all wines heavily fortified with alcohol, would be admitted at a rate not exceeding the cost of their production in countries where alcohol, potato, beet-root, and grain spirits as well as wine distillates are cheap and freed from all taxes when exported to this country. A compound containing 25 per cent of absolute alcohol, whether called sherry or otherwise, such as is made in Hamburg and other places without the aid of vineyards, would be equal in strength to one half the strength of spirits at proof. Foreign spirits at proof would pay under the proposed tariff of $1 80 per gallon for the quantity contained in such a compound, masquerading as wine, 90 cents per gallon; but under an *ad valorem* tariff of 100 per cent it would pay a tax not exceeding cost, or not more than 10 or 15 cents.

Second—Under an internal revenue tax of $1 per gallon, compounds of spirits in this country would cost, in addition to cost of manufacture, 2 cents for each degree of alcoholic strength, being the rate of tax on distilled spirits. Proof spirits contain about 50 per cent of absolute alcohol. A compound 25 per cent strong, such as the tariff would permit to be imported, would, if made in this country, pay a revenue of 50 cents, while the foreign competitors under an *ad valorem* tariff would not pay more than 10 to 15 cents.

Third—We claim, therefore, that an *ad valorem* tariff of 100 per cent on still wines would encourage the importation of cheap imitations and conflict with the internal revenue, besides setting up a discrimination in favor of foreign bogus wines.

Fourth—To prevent such discrimination and illegitimate traffic, the tariff should be specific on products containing alcohol so long as specific taxes are levied on spirits for internal revenue and tariff purposes, and the rates should be in accordance with alcoholic strength and not less than the internal revenue taxes for similar strength.

Fifth—Still wines and all imitations thereof are divided into two general classes, viz., those called natural wines, and those called fortified, to which latter there has been, in whole or in part, an addition of distilled spirits. The French Government fixes the limit of absolute alcoholic strength of natural wines for revenue purposes at 11°.* The British place the same at 15 per.cent.†

Sixth—The representatives, authorized by the various interests in this country, both native producers and importers, have agreed to recommend the former French limitation for natural wines, and to accept the limitation of 25 per cent fixed in the Wilson bill for fortified wines, and are agreed among themselves to recommend a specific tax of 30 cents for wines not exceeding 14° of absolute alcohol, and 50 cents for all over 14° and not exceeding 25°. In their behalf we respectfully submit that such a tariff in place of the proposed *ad valorem* of 100 per cent would be substantially in harmony with the proposed internal revenue tax on spirits, and equally fair to all concerned. It would protect the internal revenue from evasions, avoid abuses in trade, and yield the largest amount of revenue. The native producers in this respect yield a large measure of relief to the importers of natural wines, such as Clarets, Burgundies, Sauternes, Hocks, etc., and the importers concede the necessity of 50 cents on fortified wines as a measure to prevent illegitimate traffic and unfair discrimination in favor of foreign bogus wines.

Seventh—As to the impracticability of determining the values of wines for *ad valorem* taxation, much has been and can be said. The experience of trade teaches us also that in practice such a tariff would demoralize the wine industry and trade, both native and foreign, through the encouragement given to artificial compounds and dishonest importers.

We are, sir, very respectfully, your obedient servants,

(Signed:) C. A. WETMORE,
Representing the State Viticultural Commission of California.

(Signed:) CHARLES McK. LEOSER,
President of the Wine and Spirit Traders' Society, representing the importing merchants and the domestic producers of the East.

* Formerly 14 per cent; also 15 per cent. † Formerly 13 per cent.

As to sweet wines, the following is a brief review of the situation: Early in January last a report was circulated from Washington that the Eastern domestic interests had secured support for a proposition extending the freedom of fortification to grain spirits, and to wines made with cane sugar, glucose, etc. I was aware of the fact that, under the rulings of the Treasury Department, wines which had been sweetened with boiled or condensed must, or other saccharine, could not have the benefit of free grape spirits. I knew that it was not the intention of California producers to exclude the genuine products of Eastern vineyards where a certain amount of added saccharine was necessary, and I also knew that the most reputable Eastern wine makers did not favor the use of free grain alcohols. I knew, also, that the Commissioner of Internal Revenue was familiar with the early history of the sweet wine law, it having been framed by him, in conference with myself, eight years ago, during the first administration of President Cleveland. Therefore, before leaving for Washington, I addressed a telegram to Commissioner Miller, stating as follows:

Our producers desire that Eastern wine makers should have the benefits of free brandy, as originally contemplated, and that changes in the law may be made if necessary, provided they do not extend privileges to compounders of imitation goods and do not permit fortification of dry wines. Eastern wine makers should be permitted to use condensed must and boiled juice for sweetening, whether produced by themselves or purchased elsewhere. We do not fear the use of cane sugar if limited to necessary demands and if guarded against its use in making artificial compounds. As to an *ad valorem* tariff on wines, I shall lay before you arguments to show that it would endanger the internal revenue by permitting the importation of fortified mixtures under the name of wine for use in stretching whiskies, brandies, and cordials at a less rate of duty on the spirits contained than the internal revenue on the same produced at home. If a specific tax is imposed on spirts for internal revenue, at least an equal specific tax should be imposed on foreign products containing alcohol. With such a minimum rate, an *ad valorem* of 50 per cent in addition might be a fair method. Foreign wines containing 24 per cent alcohol should be taxed at least 50 cents per gallon to prevent evasion of the internal revenue taxes.

This message was made known to interested parties, who met me with Colonel Leoser immediately after my arrival. At the request of Mr. Switzer, representing the Eastern interests, I drew up the form of an amendment to the existing law which I believed would be mutually satisfactory. I was not mistaken; the Eastern producers were as faithful to our common cause as I expected, and immediately accepted the amendment, causing it to be introduced in Congress by Representative Whiting, who received the support of our delegation.

This amendment was incorporated in the new tariff law without any change, and is now the law, as follows:

That section forty-three of the Act approved October first, eighteen hundred and ninety, entitled "An Act to reduce the revenue and equalize duties on imports, and for other purposes," be amended so as to read as follows:

"That the wine spirits mentioned in section forty-two of this Act is the product resulting from the distillation of fermented grape juice, and shall be held to include the product commonly known as grape brandy; and the pure sweet wine which may be fortified free of tax, as provided in said section, is fermented grape juice only, and shall contain no other substance of any kind whatever introduced before, at the time of, or after fermentation, and such sweet wine shall contain not less than four per centum of saccharine matter, which saccharine strength may be determined by testing with *Balling's* saccharometer or must scale, such sweet wine, after the evaporation of the spirit contained therein, and restoring the sample tested to original volume by addition of water; *provided*, that the addition of pure boiled or condensed grape must, or pure crystallized cane or beet sugar to the pure grape juice aforesaid, or the fermented product of such grape juice prior to the fortification provided for by this Act for the sole purpose of perfecting sweet wines according to commercial standard, shall not be excluded by the definition of pure, sweet wine aforesaid; *provided further*, that the cane or beet sugar so used shall not be in excess of ten per cent of the weight of wine to be fortified under this Act."

The contest in the Senate over the proposed extension of the bonding period, after it had been defeated overwhelmingly in the House, was an exciting episode. All the Pacific Coast was aroused to secure this manifestly just measure. Against us were arrayed the combined resources of the great number of rectifiers in every great city in the country, with a certain undefined support from the so-called whisky trust, which, in fact, is only a neutral spirit trust, opposed to the demands of producers of "straight" goods. The speech and efforts of Senator White, backed by all the Senators and Representatives from this coast, won the day for which the Kentucky, Tennessee, and Pennsylvania distillers of fine whiskies have been laboring in vain for many years.

We may rest content for awhile with an eight years' bonding period, but should never relax our demand for recognition of the just principle of indefinite bonding.

I called the attention of the Treasury Department to a singular oversight in existing laws relating to the tariff on fruits and other imported goods containing alcohol, as follows:

FRUITS PRESERVED IN SPIRITS.

WASHINGTON, D. C., February 16, 1894.

To the Secretary of the Treasury :

In a former communication, signed by Col. Chas. McK. Leoser and myself, your attention was respectfully called to the inconsistency of the proposed *ad valorem* duty on wines, so long as a specific internal revenue tax is levied on spirits, on account of the opportunity to be offered for the importation of foreign spirits, disguised as wines, under a less tax than the same class of materials would pay if manufactured in this country.

Permit me to show that the principle involved requires even a broader application than we have proposed in relation to wines.

The tariff law should, by a general provision, declare that in no case shall any merchandise containing alcohol, whether distilled or only the product of fermentation, pay a less rate of duty than the rate that would be collected for internal revenue purposes on the quantity and strength of alcohol contained; that, in case the alcohol so contained is not the chief element of value in such merchandise, the duty to be collected shall be the rate on the alcohol, estimated in accordance with the internal revenue rate for alcoholic strength, in addition to the specific, or *ad valorem*, or mixed rate specially fixed by the tariff law; but in the case that the alcohol contained shall be the chief element of value, then the rate of duty shall not be less than the duty on distilled spirits. Permit me to illustrate the necessity of this broader application of the principle, by showing how it affects the home production of fruits preserved in spirits.

To preserve fruits in spirits requires a total alcoholic strength for the volume of merchandise of about 20 per cent absolute alcohol. One hundred gallons of brandied cherries or other fruits must contain forty gallons of proof spirits, and for certain uses may require much more.

The comparative cost of the materials, fruit, sugar, etc., may be said not to vary much, whether foreign or domestic.

The cost of one hundred gallons of cherries preserved in spirits at 20 per cent total strength of compound, if containing 4 per cent added sugar, would be about $17 50, spirits untaxed being estimated at 15 cents per proof gallon. Add $2 50 for fair profit and obtain $20 as basis for *ad valorem* tax, which at 30 per cent would be $6. Such material, tax paid, in casks could be landed in this country, duty paid, for $30.

The domestic producer would pay for forty gallons of cheapest form of proof spirits, under tax of $1, a revenue to the government of $40, against the $6 paid by the importer, which would be so much advantage given by law to foreign goods, and prohibit all home production.

By equalizing such revenue taxes the Government will collect, no doubt, at least $100,000 more on this item alone than under present and proposed systems, besides doing simple justice to American industry, now shut out by discrimination in favor of foreign goods.

I am, sir, your obedient servant,

(Signed:) CHAS. A. WETMORE,
Representing the State Viticultural Commission of California.

Through the efforts of Senator White, an amendment to cover this question was reported by the Finance Committee, but it was afterwards withdrawn through some misunderstanding. A partial cure was effected

by striking from the clause relating to preserved fruits, the words "preserved in spirits," but the law is still open to some misconstruction, owing to the looseness of the expression limiting the tax on compounds containing alcohol to a determination as to whether the alcohol is an element of "chief value." It is possible that this matter may be subject to departmental rulings.

BOTTLING AND BLENDING BRANDIES IN BOND.

I was specially instructed to obtain, if possible, an amendment to the laws relating to special bonded warehouses for fruit brandy, extending the privileges of our producers. It proved impracticable to incorporate such a measure in the new tariff bill, owing to the pressure of business upon the Senate. A great advance was however made toward new legislation, which may yet be accomplished.

This question being still open, I shall introduce here my statement in behalf of our demand, and the measure as it is now perfected:

PURE GRAPE BRANDIES.

DEFECTS IN EXISTING INTERNAL REVENUE LAWS, WHICH PREVENT BRANDY DISTILLERS FROM PERFECTING THEIR PRODUCTS, FORCE CONSUMERS TO PURCHASE ADULTERATED GOODS, PREVENT PHYSICIANS FROM PRESCRIBING INTELLIGENTLY, AND PROHIBIT EXPORTATION.

AMENDMENT TO THE LAW PROPOSED.

American brandies are now recognized as the best and purest in the world. The German Government, which is guided by the ablest hygienists and chemists, purchases its army supplies in this country, over forty thousand gallons having been taken during the last year. This can be done because the German Government purchases in large quantities out of bond, and directs its own treatment of the raw material.

For other foreign and domestic trade our distillers are restricted to the demands of compounders and rectifiers, and are absolutely prevented by unintentional restrictions of law from exporting anything but unfinished raw material, which is unacceptable to the consumer without further treatment. Hence we are shut out of large markets, especially in Canada, Mexico, Central and South America, where there is a demand for fine qualities in bottle and small casks.

Our distillers are only permitted to export free of tax in original packages, not less than twenty gallons, and are prevented from preparing their goods in proper condition for consumption.

All brandies in bottle and small casks must first pay an internal revenue tax, for which there is no drawback; hence they cannot compete with French brandies, which are prepared in bond and exported without tax.

For domestic consumption, the distiller is forced to sell his raw products to rectifiers and compounders, who interpose their secret methods between the distiller and consumer.

Brandy distillers desire to perfect their products in bond to suit the demands of the medical profession and consumers, and will pay all extra cost of supervision by the Government, so as not to reduce the public revenues.

The amendment to be proposed has been prepared in accordance with the advice of the Internal Revenue Department, so as to avoid all chance of fraud and all losses on account of increased expenses.

This is a question of simple justice to producers and consumers.

(Copy.)

WASHINGTON, May 25, 1894.

Hon. J. S. MILLER, *Commissioner of Internal Revenue, Washington, D. C.:*

DEAR SIR: Referring to our interview of yesterday, permit me to state briefly the points of provisions which our State Viticultural Commission, on behalf of producers and dealers in pure brandies, would like to see incorporated into a new law, and, if practicable, in the pending tariff bill.

Our object, generally expressed, is to obtain the privilege to prepare our brandies while in bond to suit the demands of trade and the tastes of consumers, preserving purity, employing methods recognized as legitimate in high-class trade and approved by the Government, without resort to secrecy, avoiding all compounding with other spirits and the use of extracts and chemicals intended to produce the effect of imitation

of natural qualities, and carrying down to the smallest style of package coming out of bond the special stamp of the Government indicating the nature of the goods and their history while under the control of the Government.

We desire, under such general provisions, to take out of bond the qualities desired, in any form or size of package required by consumers and the trade, and to export in any kinds of packages without payment of internal revenue taxes. We consider it would be just to be required to pay to the Government extra charges to cover the actual cost of the extra supervision which the Government would suffer by reason of the enlarged privileges permitted in bond, to be arranged for under regulations, subject to such changes as changing circumstances may cause.

We think it would be right on the part of the Government to determine by regulations what kinds and sizes of packages may be reëntered after blending and treatment, and the form of new bonds, and what kinds and sizes of packages must be withdrawn within a fixed period after changes made, whether for home consumption or exportation, as, for instance, in the case of small kegs and bottles, and that such operations of changing packages and proof shall be effected in a separate apartment connected with the special bonded warehouse under governmental supervision. * * *

With your permission, I would like to have the opportunity to discuss the details of such a plan with any officer of your department to whom you may refer this matter, to the end that a measure may be drawn to be presented in Congress that would meet your approval.

Yours respectfully,

CHARLES A. WETMORE,
For the State Viticultural Commission of California.

ARGUMENT IN SUPPORT OF PROVISIONS OF PROPOSED AMENDMENT.

It may be taken for granted that none of the laws relating to the collection of internal revenue, especially with respect to the taxation of such products as are expected to render an important revenue to the Government, have for their object any restrictive or prohibitive purposes other than those intended to prevent fraud. The purpose of the Government is to tax certain products, not to direct the method of production or the customs of trade. Wherever it may be shown that the law or regulations based upon law operate to restrict the producer in those legitimate practices belonging to his art which he would desire to pursue if restrictive legislation did not prevent him, it is fair to presume that the Government will not interpose any objection to such changes in the law as may be necessary to relieve the producer, unless it can be shown that the collection of revenue might be thereby prevented.

The object of this paper is to show that the legitimate industry of the brandy producer is practically now under the direction of the Government, and so restricted that progress in the art and expansion in trade are totaly prevented. If it could be shown that the restrictions complained of resulted in larger revenue to the Government, there might be some excuse for what might be termed the tyrannical interference with private rights, just as it might be defensible for the Government to seize upon distilling as a monopoly for revenue purposes. We claim, however, that the changes which we desire will not in the least decrease the public revenues, and we are willing that all additional expenses that may be incurred by the Government by reason of such changes shall be charged to the industry, in addition to present taxation. Furthermore, we claim that in so far as the legitimate business of the brandy distiller is freed from unnecessary restriction, the Government must necessarily reap a benefit in proportion to the mutuality of the advantages obtained. Still further, the public, for whose benefit all taxes are imposed, as it will be shown, is seriously injured by restrictions which prevent the distiller from perfecting his products, and will be correspondingly benefited by any legitimate liberty which may be restored and which is now, as we claim, unintentionally interfered with.

It cannot be pretended by any one that the distillers, or those handling and manipulating brandies or other products, should be prevented by rigid laws from bringing their products to the highest state of perfection before being offered to consumers; or, in other words, that the Government should interpose its power under a plea of revenue necessities and check the producer so that his work must end in an unfinished condition and the credit, as well as the duty, of finishing the same shall be transferred to others. This, however, is precisely what happens to the producer of brandy under the operation of existing laws.

In actual practice, as may be well comprehended, the payment of a tax which in most cases exceeds the cost of production, terminates the control of the producer over the work of his hands, and transfers all further operations to those who pay the tax. No producer is able, in any considerable degree, to undertake the advance of funds to the Government before he has secured purchasers for his products. Yet the existing laws prevent the producer or owner of pure brandies from completing the operations necessary to perfect his distillations between the time of original distillation and the payment of tax, and even compels the distiller to prepare his distillates in such a manner that they are not acceptable to consumers before permitting the bonding privilege. Respecting this last statement, it is sufficient to say that although the law can easily determine the tax that is to be levied in accordance with alcoholic strength, the distiller cannot place his goods in bond at the commercial standard of strength as demanded by

consumers, without paying an extra tax in excess of that contemplated by law. He is not permitted to place brandies in bond with a strength of less than 100 proof without paying the rate of tax levied on proof spirits, notwithstanding he is permitted to bond them at any degree above 100, and the Government finds it easy to determine the amount of his tax in accordance with strength. The standard of strength required for actual consumption for medicinal purposes is generally less than 100, and it is quite as easy for the Government to determine the tax that shall be levied for brandies below proof as it is for those above proof; yet here is a restriction of law which does not benefit the Government, but seriously and unnecessarily interferes with the producer. Moreover, this restriction operates against the interest of the consumer by compelling him to procure his supplies, generally, from irresponsible parties not connected with the original producer, and certainly disconnected with the credit and reputation that attach themselves to skill in original production. This is only one of the instances where the business of "doctoring" is interposed arbitrarily between production and consumption, free from all safeguard in the interest of the people, unjustly cutting off the original producer from direct relation with the consumer. If such restrictions were not imposed, distillers would aim to please and satisfy consumers, and to acquire such reputation as would cause them to merit the recommendation and approval of the medical profession and connoisseurs. The opportunity to achieve such reputation would stimulate the original producer to improve in every possible manner the quality of his products, and thereby benefit the public generally. Under present circumstances, however, the value and reputation of distillers' products concern only a body of men, interposed arbitrarily by law between the consumer and the original producer, whose methods are secret and controlled by no such restrictions as will enable the consumer to identify the excellencies of original production.

The consequence of such restriction reacts upon the pride and ambition of original distillers, and prevents them from realizing profit through the pursuit of the highest excellence, and the demand of the consumer is not permitted to have its influence upon the original source of supply. This, we claim, is restriction that is not contemplated by the law which levies taxes upon our brandies and is not productive of increased revenue. The laws of supply and demand are arbitrarily and unnecessarily interfered with, to the injury of all legitimate interests concerned.

Before going further it may be necessary to make certain statements to explain wherein the production of brandies differs materially from other distilling operations. Brandy is produced from the distillation of fermented grape juice. This fermented grape juice in actual practice differs in essential qualities in almost innumerable ways. Every known variety of grape, of which there are hundreds in actual production, produces by distillation distinctly recognizable different qualities, in many cases as distinct in certain flavors and essences as the distillates of different fruits, as, for instance, brandies from Muscat grapes, which have certain positive flavors popularly recognized, and those from delicate wines, such as those which produce the highest types of cognacs. Not only are these distinctions in grape distillates true as regards the kinds of grapes cultivated, but they are also true of different methods of combination of two or more kinds of grapes, and they are true also of different methods pursued in the preliminary operations of fermentation. Still more are they true of the different conditions of wines after fermentation and before distillation. Inferior brandies are made from the wash extracted from pomace after pressing wine; also from wines which are defective and sent to the still because they would be rejected for consumption as wines. There is a marked and definite recognizable difference between the distillates from grape juices which have fermented with or without the pomace. To attain the highest results in delicacy and refinement of flavor requires greatly increased cost in materials distilled. The inducement to improve the quality of products is reputation, which enhances profits. So long, however, as the distiller is unable to come into direct relations with the consumer he depends mostly for his incentive as to quality upon the artificially created middle men, who doctor his unfinished products according to their ideas of profit, and generally resort to debasement of original material for the sake of profit by mixing it with cheaper alcohols of neutral character. It is for this reason that brandies of coarse and high flavor are often demanded, because they permit of larger expansion with neutral grain alcohols than the more delicate distillates do. Brandy producers are therefore compelled almost entirely to limit their ambition to the satisfaction of rectifiers, and find no profit in attempting the highest degrees of excellence.

It follows from the foregoing that, out of the almost innumerable grades of quality of original distillations of brandy, practically innumerable grades of excellence may be attained through skillful blending, and the varying cost of such blends may practically be within the control of the blender. Every known producer of brandies who has an extended reputation demonstrates in a manner that can be popularly understood, the very great difference between essential features of brandy production and those of other distilled beverages. Martel and Hennessey brandies are known throughout the world to have different grades of excellence, distinguished by well-known trade-marks, such as "one star," "two star," "three star," and many others better known to connoisseurs. It becomes necessary to satisfy the demands of consumers that such distinctive marks should represent practically uniform and unvarying degrees of quality and distinctions of flavor, as well as color, etc. Without such uniformity no distiller or dealer in brandies can acquire commercial reputation. This uniformity in each particular grade is the result of careful blending of original materials, skillfully selected and preserved accord-

ing to standard, capable of repetition from year to year by drawing upon new supplies, which, in their original state, vary greatly in quality. One of the essentials of a well-organized brandy production is a large reserve stock of old brandies of varying degrees of original cost, which are kept somewhat after the fashion of developing the highest grades of sherries in Spain, for the purpose of blending in various degrees or proportions with younger brandies, thereby varying at the will of the producer, in accordance with the demand of the consumer, the cost and quality of the merchandise he offers to the public. It is absolutely necessary in order to perfect such combinations that the operations of blending shall be carefully and skillfully conducted long before they are offered on the market, and it is necessary also that the general dealer shall utilize to the best advantage the products of more than one distiller, although in certain cases some distillers who conduct large operations may accomplish the same by drawing upon the resources of many different vineyards.

The time within which these various operations must be perfected is the period between the original distillation and the withdrawal from bond for consumption.

Our brandy distillers respectfully ask Congress to remove those restrictions which now prevent them during the bonded period from perfecting their products in accordance with the demands of trade and in conformity with the competition which they meet in this and other countries with brandies whose producers have in foreign countries all the natural privileges which we now contend for. We ask only that our business during this period shall not be unnecessarily interfered with, and that where such interference now exists we hold that it was not the intention of Congress, but only the result of a lack of proper demand at a time when our industry was in its infancy and our necessities unknown even to ourselves. If any additional cost is caused by such privileges to defray the expense of supervision, we are content to pay such additional charges as shall defray such cost at the time that it is incurred; but inasmuch as such increased expenses are added to the cost of production, and cannot be remitted when our goods are intended for exportation, we ask that the charges shall be limited to actual cost and not be considered a source of revenue.

We do not desire to interfere with the legitimate business of the rectifier, which in actual practice is generally not the perfection of highest types of excellence, but rather the cheapening of products to suit the lowest demands of trade, and whose profession is now such as would be inconsistent with any idea of improvement in quality and reputation. We do not think it is fair to the distiller of genuine brandies to compel his goods, when treated in the manner in which we desire to have them treated in the special bonded warehouse, to bear the rectifier's stamp, which, by reason of the practices permitted to rectifiers, invariably casts discredit upon the goods so branded.

Except in very few cases, the distiller of brandy cannot tell at the time he is compelled to place his products in bond what will be their ultimate destination and in what form they will be demanded by the public. Most of the brandy distillers are small producers who have no relations with trade except through the wholesale dealer or some larger distiller. We claim that we should have the privilege of withdrawing from bond in such kinds and sizes of packages as may be demanded by trade when the same are matured for consumption. This will necessitate the change of packages in the bonded warehouse and will be necessary to complete the work of the distiller or those who handle his products before his goods go on the market, and to enable him to carry the evidence of his skill by proper marks throughout all his operations.

For the foreign trade we need to withdraw from bond packages similar to those used by our competitors and to be free, when we export, from internal revenue taxation. Under existing laws and regulations the brandy producer is limited in exportation free of tax to original packages of not less than twenty gallons. As shown before, these original packages must contain grape spirits not less than 100 proof, and are of such varying quality that any general trade with foreign countries is practically prohibited and can be enjoyed only by those who limit themselves to such special trade and conduct their affairs on a large scale. At the present time, if we reduce our brandies to commercial strength, blend them for uniformity, or change the packages or bottle, we are compelled, before exportation, to pay our internal revenue tax besides the tax of entry into the country to which we export. Our competitors of France are subject to no such restriction and taxation when exporting their goods, and consequently enjoy a practical monopoly of the trade of Mexico, Central America, South America, and other places to which California brandies might easily be exported if we were not prevented by restrictive laws.

We do not expect to increase the product of our brandies to any great degree, even though such privileges as we ask are granted, and therefore there need be no apprehension on the part of those who view all distillation with distrust. The reason of this is that brandy distillation is not the main object of grape growing. Brandy is a by-product which increases materially only when unusual vintages are caused by forces of nature beyond the control of the grower, and diminishes when wine is profitable. Brandy distillation will be continued as a direct object to a certain degree only to satisfy a positive demand; it cannot be indulged in speculatively, because the cost of material when wines bring normal prices is so great that the distillate is much more expensive than that of grains. For medicinal purposes there is a positive but limited demand; but for such demand pure brandy unmixed with other spirits is required, and with few exceptions the order, when made, is for goods in bottle. Under present circumstances it is practically impossible for any person on the recommendation or direction of a

physician to purchase a bottle of pure brandy unless he happens to know intimately the history of the product he purchases, and it is equally impracticable for the general public to insist in all such cases upon an investigation to determine the purity of products. The distiller is unable to reach him, having been debased by an arbitrary restriction to the rank of a rectifier before he can approach the public, even if he has only added sufficient distilled water to reduce his goods to the standard of commercial strength. By permitting distillers to bottle in bond, every physician in the country will be materially assisted.

There is a known demand for a certain quality of very high proof neutral brandy spirits for use by those manufacturing fine grades of perfumery and also for the preparation of very delicate liqueurs; but brandy distillers cannot in advance make preparations at the first distillation to meet this demand, and by reason of the restrictions during the bonded period they are prevented from raising the proof by redistillation when such demand comes. It is true that they may withdraw such brandy from bond, tax-pay the same, and as rectifiers raise the proof and quality as desired, but it is well known that the discredit attaching to the brand of a rectifier would utterly prevent them from having true credit for the purity of their product, and in case it was intended for exportation the increased cost by reason of having paid the internal revenue tax would utterly prohibit any trade with foreign countries. For these reasons we desire to raise as well as to lower proof during the bonded term.

In conclusion, what we desire to do in bond is in accordance with legitimate practice in our industry, which practice is not interfered with anywhere else in the world, and is essentially the right of the producer. So far as existing laws operate to restrict the essential operations of our industry, with injury to us and with no profit to the Government and with no benefit to the consumer, we ask to have them modified, subject to such regulations as may be necessary to protect the public revenues, agreeing that increased expense by reason of this demand shall fall upon the producer.

THE STATE VITICULTURAL COMMISSION OF CALIFORNIA, AND
THE COMMITTEE OF THE SAN FRANCISCO WINE DEALERS' ASSOCIATION,

By CHAS. A. WETMORE,
Special Delegate.

WASHINGTON, June 11, 1894.
To the Hon. JOS. S. MILLER, *Commissioner of Internal Revenue, Washington, D. C.*

The provisions of the proposed amendment were carefully prepared, with the assistance of officers of the Internal Revenue Bureau, and submitted to Commissioner Miller, who reserved judgment as to the policy of the department respecting any recommendations. It was placed before the sub-committee of the Finance Committee by Senator White, with a request for its approval as an amendment to the internal revenue measures in the tariff bill.

Having been referred to Commissioner Miller for his opinion, it was sent back with a letter, of which the following is a copy:

TREASURY DEPARTMENT,
OFFICE OF THE COMMISSIONER OF INTERNAL REVENUE,
WASHINGTON, D. C., June 13, 1894.

Hon. JAMES K. JONES, *U. S. Senator, United States Senate, Washington, D. C.:*

SIR: I have the honor to return herewith the draft of a section relative to grape brandy proposed as an amendment to the revenue bill (H. R. 4864), and to state in reply to your inquiry that the passage of this section would doubtless prove advantageous to the grape brandy distillers, and to the owners of such spirits in special bonded warehouses, as it would enable them to secure uniformity in the grades of their products, and to furnish the qualities and quantities called for with greater exactitude than heretofore, all as fully set forth in the accompanying statements of Mr. Charles Wetmore on behalf of the manufacturers.

Upon considering the measure from an internal revenue standpoint, however, I do not find anything to recommend it.

The section, if it becomes law, will complicate the accounts of internal revenue officers, will impose additional duties upon them, and will thus increase the number of such officers. As there does not seem to be any reason why the manipulations permitted by the proposed section, as to grape brandies, should not with equal propriety be accorded to distillers and owners of bourbon whiskies and rye whiskies; its enactment into a law would pave the way for a passage of a similar law relative to these whiskies, a measure which would result in much larger increase in the force of internal revenue officers.

I am, therefore, unable to recommend the passage of this measure.

Respectfully yours,

(Signed:) JOS. S. MILLER,
Commissioner.

The Finance Committee were not willing to act in the matter without further recommendation of the measure. I submitted to Senator White the following comments on Commissioner Miller's report:

This report contains two good reasons why the amendment should be adopted:

First—It is shown that it would be advantageous to the grape brandy distillers, and to such an extent as would be considered just and right, and in conformity with usage in all other countries.

Second—It is shown also that the genuine distillers of whiskies, bourbons, and ryes would be benefited by similar provisions.

It is not shown, however, why the genuine whiskies should not be accorded these natural privileges.

So far as the distillers of grape brandies are concerned, they are heartily in accord with the producers of genuine whisky, and have united with them in asking for legislation jointly for this purpose, a bill to accomplish which has been introduced in the House and is now before the Ways and Means Committee.

If it is, as shown by the Commissioner, beneficial to these genuine interests to have such legislation, it is wrong on the part of the Government to interpose any objection, unless it can be shown that the public revenues will be seriously injured.

The other incidental objections on account of increased work for revenue officers seem to be untenable, because the amendment provides for stamps to be paid for intended to cover all additional cost and expense.

The amendment was drawn in the office of the Commissioner especially to cover this question of increased expenses. The provision for stamps and the cost of the same was proposed in the Internal Revenue Office to cover such expense.

If it should be considered that the stamps provided for might not be sufficient to cover this increased expense, there might be added to the amendment the following clause:

"*Provided*, That if it should be found by the Commissioner of Internal Revenue that in any case the amounts paid for the United States standard brandy stamps provided for herein shall not be sufficient to cover the expenses incurred by the Government in supervising, as hereinbefore provided for, the operations of blending, improving, and otherwise treating brandies in special bonded warehouses, then there shall be assessed to the distiller or owner of such brandies, at whose request such operations are made, an additional amount sufficient to cover the difference between the cost of such stamps and the extra expenses incurred by the Government, which shall be paid by him at the time and in the manner as provided for other assessments in this section."

Further conference with Commissioner Miller and Mr. Bates, Chief of the Division having charge of special bonded warehouses, resulted in making changes in the measure, so as to simplify the administrative features, and to cause it to assume the character of a measure to increase the public revenues. The new features provided that all persons claiming the privilege of blending and bottling in bond should be classed as "standardizers," and pay a special tax equal to that imposed upon "rectifiers."

The following provisions were proposed to be added at the commencement of the measure:

Special taxes are imposed as follows:

Standardizers of grape brandy shall pay two hundred dollars.

Every person who prepares grape brandy in the manner authorized by this section shall be regarded as a standardizer of grape brandy and engaged in the business of standardizing grape brandy; provided, that any person who standardizes, as herein provided, less than five hundred barrels a year, counting forty proof gallons to the barrel, shall pay one hundred dollars.

The text of the original document was as follows:

Proposed Amendment.

That on the ninetieth day after the passage of this Act, and thereafter, any distiller or owner of grape brandy in any special bonded warehouse, such brandy when in the original packages having a strength of not less than the strength of proof spirit, as defined in Title XXXV of the Revised Statutes of the United States, may, in such portion of such warehouse, separated by secure and unbroken partitions from the rest of the warehouse, as the Commissioner of Internal Revenue shall for the purpose approve, and to be known as a standardizing room, and upon the making of such entries, and the filing of such bonds and other security, and under such regulations, conditions, and limitations, and upon the affixing of such stamps and brands as the Commissioner of Internal

Revenue, with the approval of the Secretary of the Treasury, shall prescribe, prepare the grape brandy owned or produced by him to suit the demands of trade, both for domestic consumption and exportation, as to strength, color, sweetness, flavor, brilliancy, and freedom from cloudiness and sediment, by transferring the contents of original casks or packages into new wooden or glass packages, by filtering, redistilling, and adding distilled water, and by such other treatment as is recognized as legitimate in securing a uniformly high grade, such treatment to be authorized by the published regulations of the Commissioner of Internal Revenue; *provided*, that the time limited by law within which spirits may remain in any bonded warehouse without payment of the tax shall not be extended by this section. That the brandy transferred into bottles shall be withdrawn either tax-paid or for export or for use of the United States within three months from the date of such transfer, although, under the conditions of the warehousing bond, it may be otherwise entitled to remain therein a longer time.

That the stamps affixed to the new packages shall be engraved stamps, to be provided and furnished by the several Collectors as in the case of other stamps, and to be charged to them and accounted for in the same manner, and for the expense attending the providing and affixing such stamps ten cents for each cask or outer case or package so stamped, and one cent for each bottle so stamped shall be paid to the Collector on making the entry for the transfer from the standardizing room into the other portion of the bonded warehouse; and such stamps shall be denominated "U. S. Standard Brandy Stamps."

That the treatment, including the addition of water, shall not be such as to reduce the alcoholic strength of the brandy to a point below eighty-five per cent of the strength of proof spirits.

That no substances other than distilled water shall be added without express published authority of the Commissioner of Internal Revenue, and no spirits other than the grape brandy in the warehouse shall be used in these operations.

That no substances whatever shall be added to the brandy produced by any distiller without his express permission in writing, or in the event of his death that of his heirs, executors, or administrators, nor shall his brandy be mingled with that of another distiller without such permission.

That the quantity contained in casks or other packages filled in the standardizing room shall not be less than as follows:

Every cask (which must be of wood) not less than ten taxable gallons.

Every bottle not less than one fifth of a gallon.

Every case (which must be of wood) for casing bottles shall contain twelve bottles.

Every outer case (which must be of wood) shall contain in its inner cases and bottles not less than ten taxable gallons.

That as soon as the process of standardizing is completed the brandy shall be immediately drawn into the casks or packages herein described, to each of which bottles the coupon strip stamps, and to each case containing twelve bottles the stamp to which the coupon was affixed, and to each cask and outer case the warehouse stamp for standardized brandy prescribed by the Commissioner of the Internal Revenue shall be affixed and the cask or other package shall be removed from the standardizing room into the other portion of the bonded warehouse, the proceedings to be in all respects, so far as practicable, in accordance with those prescribed in Section 3287 of the Revised Statutes of the United States.

That the stamps on casks and outer cases containing the standardized brandy shall be issued by the Collector and signed by the storekeeper and gauger and shall specify the number of taxable gallons in the cask or package, and each stamp for inner cases shall have twelve coupons attached, each coupon to be a strip stamp for each bottle to be contained therein, all stamps to be numbered serially, the coupons to have the same number as the stamp, and the cases will be sealed as the Commissioner of Internal Revenue shall prescribe.

That no allowance for leakage shall be made as to brandy in glass packages or in packages of any material other than wood.

That no allowance for loss in any of the processes or manipulations authorized by this section shall be made, and the tax on such losses shall be assessed upon the principal of the bond covering the brandy to be standardized and paid by him during the month next succeeding the month in which the loss occurs.

That the taxable gallons of standardized brandy shall be determined by the number of proof gallons, although the proof thereof may be less than one hundred per centum.

That when the tax on any portion of the contents of any cask or package of standardized brandy becomes due the tax thereon must at once be paid if the quantity exceeds ten gallons; and if the quantity is ten gallons or less, then the tax on ten gallons in the cask or package must be paid and a tax-paid stamp representing the tax-paid quantity will be affixed to the cask, and when the cask or package is withdrawn from the bonded warehouse tax-paid the central portion of the tax-paid stamp or stamps so affixed will be cut out and delivered to the Collector in part payment for the stamp indicating the whole amount of tax to be paid upon such withdrawal. But such package may not be withdrawn for any purpose free of tax.

Any person who shall defraud or attempt to defraud the United States of the internal revenue tax on any distilled spirits transferred into any standardizing room shall be deemed guilty of a misdemeanor, and shall be subject to a fine of not less than five hundred dollars or to imprisonment for not less than six months, or both, at the discre-

tion of the Court, and the spirits as to which the fraud is perpetrated shall be forfeited to the United States.

The internal revenue officers and the distillers or owners of the brandy shall keep such books and make such reports as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe.

All casks or cases of standardized grape brandy shall, upon being withdrawn tax-paid from the bonded warehouse, have tax-paid stamps affixed thereto as in the case of other brandy so withdrawn, and any cask or package of tax-paid standardized grape brandy to which the tax-paid stamp is affixed may be exported with benefit of the drawback on the number of proof gallons contained therein when exported as in the case provided for in Section 3329 of the Revised Statutes of the United States.

And any package of standardized grape brandy and any original cask or package of fruit brandy containing not less than ten taxable gallons in any special bonded warehouse may, except in the case hereinbefore provided for, be exported in bond free of tax as in the case provided for in Section 3330 of the Revised Statutes of the United States and in Sections 1 and 2 of the Act of June 9, 1874 (18 Stat., p. 64), Section 10 of the Act of March 1, 1879 (20 Stat. 327), the Act of December 20, 1879 (21 Stat. 59), and Section 11 of the Act of May 28, 1880 (21 Stat. 145), the provisions of which statutes are hereby made applicable to the standardized grape brandy withdrawn for export in bond free of tax.

Several unimportant changes were suggested for the body of the foregoing text, to make it accord with the additional clauses, which need not be mentioned here, because, before any further action is taken, it is probable that a new draft for a law must be made.

A slight change in the wording of the above would limit its operation to brandies for export only, which, although not sufficient to satisfy our greatest needs, would be of great value to us and might be agreed to if better terms cannot be made.

PART IV.

CHEMICAL ANALYSIS OF CALIFORNIA WINES.

REPORT ON SAMPLES SUBMITTED AT THE COLUMBIAN WORLD'S EXPOSITION TO PROF. H. W. WILEY, CHIEF CHEMIST OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

[At my request Prof. H. W. Wiley, Chief Chemist of the United States Department of Agriculture, was present during the examination of the California wines and brandies by Mr. C. F. Oldham for the British Royal Commission. At the conclusion of the work, a full set of samples were forwarded to the laboratory in Washington to be analyzed. The work was done under the supervision of his assistant, Mr. W. H. Krug, who expressed to me a desire for further samples of younger wines to be selected carefully so as to represent exactly the various districts and different classes of soils of vineyards. I informed him that from the samples at Chicago he could not make a satisfactory report with reference to locality, because a very large number represented wines made up from grapes purchased at wineries from many different places, no accurate record of which could now be obtained; quite a number also were wines from merchants, who purchase from different districts.

The report which has been made is very valuable, but would be misleading if it were not understood that the samples in many cases represented small experimental results of first vintages from new varieties of European grapes, managed by men who were acquiring experience under difficulties. Defects that are noticeable in some of these older samples are not found in the same degree in our later young wines. Especially is this true with reference to the use of sulphur fumes in treating cooperage, experience having taught many improvements.

Some of the opinions of Mr. Krug, relating to methods of wine making as revealed by analysis of products, require further investigation of new samples, and are therefore excluded from this publication.—C. A. W.]

SOME CHARACTERISTICS OF CALIFORNIA WINES.*

By W. H. Krug.

Among the exhibits of American products at the World's Columbian Exposition at Chicago in the year 1893, one of the most interesting and varied was that of the California wine producers at the California State building. The wines shown there represented all the important districts in the State and the various types grown. At the suggestion of

* The tables containing details of analyses by Mr. Krug are to be found at the end of this publication.—C. A. W.

Dr. H. W. Wiley, Chief Chemist of the United States Department of Agriculture, the California Viticultural Commission sent a set of these wines to the laboratory of the department, where they were analyzed under my supervision. All important varieties were represented, and the analyses were made as complete as possible.

The wines were classified as follows:

Dry White Wines.—36 of the Rhenish type.
38 of the Sauterne type.
6 of the White Burgundy type.
7 Miscellaneous.

Dry Red Wines.—37 of the Claret type.
22 of the Medoc type.
20 of the Burgundy type.

Sweet or Fortified Wines.— 6 of the Sherry type.
13 of the Port type.
9 Miscellaneous.

In toto, 194.

GENERAL REMARKS.

California wine producers grow European types almost exclusively, and it will be seen from the table of analyses that they aim to follow these types in their description as closely as possible. This is carried even to the extent of adopting the various styles of bottles used in the European trade.

A few of the white wines were considerably deeper in color than the European wines of the same type. By far the greater number, however, were perfectly clear and brilliant, showing that great care had been exercised in maturing and preparing for bottling. This was especially true of the red wines.

The following determinations were made: Specific gravity; alcohol by weight; alcohol by volume; extract; total acidity as tartaric acid; polarization of 26.048 g. in 200 mm. tube; polarization of the wine in 220 mm. tube; wild polariscope; reducing sugar as dextrose; glycerol; tannin and coloring matter; albuminoids; ash; sulfuric acid in ash; potassium sulfate in 100 cc. of wine, stated in grams; chlorin in ash; sodium chlorid in 100 cc. of wine, stated in grams; insoluble residue in ash; sulfurous acid and salicylic acid.

In the sweet wines the polarization was determined after inversion and after fermentation, the result being stated both in terms of 26.048 grams and of the original sample. The work on the color intensity and the presence of foreign coloring matters has been delayed unavoidably, and will not be ready in time for incorporation in this paper. It is intended to make this branch of the investigation especially complete.

METHODS OF ANALYSIS.

Specific Gravity.—The specific gravity was taken on an analytical balance by means of a Westphal bob, whose displacement had been previously determined.

Alcohol.—One hundred cc. of the wine were placed in a flask with 50 cc. of water and a little precipitated calcium carbonate, the flask attached to an upright condenser, and the contents of the flask subjected to distillation. To prevent the volatilization of the alcohol the condenser

tube should be made to extend almost to the bottom of the receiver. A 100 cc. flask was used for a receiver, and when 100 cc. of the distillate had passed over the operation was interrupted and the flask removed, shaken, and the specific gravity of the distillate determined in the same manner as given under specific gravity. The percentage of alcohol by volume was determined from the specific gravity by Table II, on page 213, in Bulletin 38, Division of Chemistry, United States Department of Agriculture, and the percentage of alcohol by weight was determined by multiplying the percentage of alcohol by volume by the specific gravity of absolute alcohol, and dividing that product by the specific gravity of the wine.

Extract.—The direct method was used. In the case of dry wines, 50 cc. were weighed and evaporated on the water bath to a sirupy consistency in a platinum dish about 85 mm. in diameter. The residue was dried two and one half hours in a drying oven at 100°. Of the sweet wines only 10 cc. were weighed and diluted with distilled water before being evaporated.

Total Acidity (expressed as Tartaric Acid).—Ten cc. of the wine were carefully measured into a beaker, diluted with distilled water, and a few drops of neutral litmus solution added. N/10 sodium hydrate solution was used in the titration, and the neutral point was determined by placing a drop of the liquid on delicate litmus paper. This was found to work equally well on white and red wines. A standard solution of calcium hydrate has been recommended for red wines, the end-reaction being the appearance of a flocculent precipitate. I found it much more difficult, however, to observe this than to note the neutral point with sensitive litmus paper. Before this point is reached the natural coloring matter of the wine will change, indicating the approach of neutrality, so that the operator can work without difficulty to within a tenth of a cc.

Glycerol.—(A) *In Dry Wines:* One hundred cc. of wine were evaporated down to about 10 cc. on the water bath with about 5 g. of fine sand. Milk of lime was then added until the reaction was strongly alkaline and the evaporation carried almost to dryness. The residue was gently heated on the water bath with about 50 cc. of 96 per cent alcohol, and mixed with a glass pestle until a homogeneous paste was obtained. It was allowed to settle and the supernatant liquid filtered through a folded filter. The residue was repeatedly extracted in this manner until about 150 cc. of filtrate were obtained. To this a few pieces of glass or sand were added to prevent bumping, and the alcohol carefully distilled off over a small frame until about 15 cc. remained. The evaporation was then continued on the steam bath until the residue became sirupy. After cooling it was dissolved in 10 cc. of absolute alcohol and 15 cc. anhydrous ether added, the flask well stoppered and shaken. When the precipitate had collected on the sides of the flask the clear liquid was decanted into a tarred glass-stoppered weighing bottle, capable of holding about 50 cc., the precipitate washed once or twice with a few cc. of a mixture of two parts of alcohol and three of ether, the washings being transferred to the weighing bottle, the ether-alcohol removed on the water bath, the residue dried one hour in a water oven and weighed. When the precipitate caused by the addition of the ether remains flocculent it

is separated by filtering through a small filter, which is then washed repeatedly with a few cc. of the ether-alcohol mixture.

(B) *In Sweet Wines:* One hundred cc. of the wine are evaporated to a thick sirup on the water bath with about 10 g. of sand. The residue is repeatedly extracted with absolute alcohol until from 100 to 150 cc. have been used (the amount being varied with the amount of sugar present). The extracts are united in a large flask, and one and one half parts ether added for every part of alcohol used. The flask is stoppered and allowed to stand until the liquid is clear. Almost all the sugar is present in the sirupy precipitate, while the glycerol remains in solution. The clear liquid is decanted into a flask, the residue washed repeatedly with small quantities of the ether-alcohol mixture, and the united liquids distilled. The evaporation is completed on the water bath, the residue washed into a porcelain dish by means of a little water and treated as in "A."

Polarization.—The wines were all polarized in a Schmidt & Haensch instrument with a 200 mm. tube. In the case of the dry wines, 50 cc. were evaporated down sufficiently to permit the addition of 3 cc. lead subacetate solution and 3 cc. of a saturated sodium carbonate solution to the white and respectively 6 cc. of each solution to the red wines. The precipitate was filtered off and the filtrate polarized. In the case of the sweet wines, 25 cc. were taken and made up to 50 cc.

The sweet wines were both inverted and fermented. For inversion 25 cc. were placed in a 50–55 cc. flask, 2.5 cc. strong hydrochloric acid added. The flask was heated in a water bath to 68° C., consuming about ten minutes in heating. It was removed, cooled quickly to room temperature, filtered, and polarized. For fermentation 50 cc. were placed in a wide-mouthed flask, a quarter of a cake of Fleischmann's compressed yeast and a sufficient amount of a potassium fluorid solution added, so that 10 mgs. of this salt were present. The flask was allowed to stand four days at room temperature, when it was found that fermentation was complete. The liquid was then washed into a 100 cc. flask, 4 cc. of lead subacetate solution, 2 cc. of mercuric nitrate solution (U. S. Dept. of Agr., Div. of Chem., Bul. 38, p. 198), and a varying amount of thick alumina-cream added. It was then made up to 100 cc. with water, filtered, and polarized. The mercuric nitrate solution was added to destroy any bacteria which might impair the transparency of the filtrate when the latter by any chance stood for a length of time before being polarized.

If after inversion the wine polarizes more strongly to the left, unfermented cane sugar is present.

If after fermentation it polarizes to the right, unfermentable constituents of commercial glucose are probably present, or the fermentation has not been successfully accomplished.

Reducing Sugar.—This was determined by Allihn's gravimetric method, and was calculated as dextrose.

Reagents—

1. 34.639 g. crystalline copper sulfate dissolved in water and diluted to 500 cc.
2. 173 g. Rochelle salt.
   125 g. potassium hydrate.

Dissolved in water and diluted to 500 cc.

In White Wines.—Fifty cc. were neutralized with sodium carbonate, the alcohol removed by heating on the steam bath, made up to the original volume with water and filtered through a dry filter. When necessary this solution was diluted with water to bring the reducing sugar down to 1 per cent or less.

Thirty cc. of the copper solution, 30 cc. of the Seignette solution, and 60 cc. of water were placed in a beaker and heated to boiling. Twenty-five cc. of the sugar solution were then added and the whole boiled two minutes. The cuprous oxid was immediately filtered off and washed with hot water. It was then dissolved in dilute nitric acid, reduced to copper by the usual electrolytic method, and weighed in that form.

The *Red Wines* were decolorized by filtering through bone-black, the first portion being rejected and the second portion treated precisely as the white wines.

Tannin and Coloring Matter.—The Löwenthal method was used.

Reagents.—Permanganate of potash solution: 1.333 g. crystallized potassium permanganate in a liter of water.

Indigo solution: 6 g. sodium indigo sulfate and 50 cc. concentrated sulfuric acid per liter of water.

Tenth-normal (N/10) oxalic acid solution.

Washed bone-black suspended in water so as to make a thin paste.

(A) One hundred cc. of wine are dealcoholized by boiling and the lost weight restored with water. Ten cc. of the dealcoholized wine are transferred to a large porcelain casserole, 20 cc. of the indigo solution and about 750 cc. of distilled water added, and the titration carried out with the permanganate solution, adding a cc. at a time until the liquid becomes green, when it is added drop by drop until the color turns to golden-yellow. (Result A.)

(B) Ten cc. of the dealcoholized wine are diluted with water, a few cc. of the bone-black added, the liquid well stirred with a glass rod and allowed to stand some time. The bone-black is then filtered off and washed repeatedly with water. The filtrate is diluted to about 750 cc. and titrated as in "A" after adding the indigo solution. (Result B.)

Result A — Result B = cc. required by the tannin and coloring matter. This is stated in terms of oxalic acid.

Ash.—The residue from the extract determinations was carefully incinerated and weighed. In the sweet wines the ash was determined by charring the extract and exhausting with hot water. The insoluble residue, consisting mostly of carbon, was collected on a filter, washed, dried, and burnt separately; the residue from the water extract was added to this, and the whole heated to low redness until white.

Albuminoids.—The Kjeldahl method was used, the wine being previously evaporated to dryness in the digestion flasks. The amount used varied with the wines, it being necessary to use as little as 10 cc. of some of the sweet wines on account of the tendency to foam when digested with sulfuric acid.

Sulfuric Acid and Chlorin in the Ash.—The ash was digested with hot water and a few drops of nitric acid and filtered into a 50 cc. flask. The residue was washed with hot water until the flask was full to the

mark. It was cooled, made up, and the sulfuric acid estimated in an aliquot portion in the usual manner. In another portion the chlorin was determined volumetrically with N/200 silver nitrate solution. They were, respectively, converted to grams potassium sulfate and sodium chlorid in 100 cc. of wine.

INSOLUBLE RESIDUE IN ASH.—The filter and residue were ignited in a weighed platinum crucible and weighed.

SULFUROUS ACID.—In the determination of sulfurous acid 100 cc. of the wine were diluted in a distilling flask with 50 cc. of water, acidulated with 5 cc. of dilute sulfuric acid (H_2SO_4 1 part, H_2O 3 parts). The distillation was carried on in an atmosphere of carbon dioxid and the distillate received in a flask containing a measured quantity of N/10 iodin solution.

The condenser tube should extend well below the surface of the iodin solution, and in case a current of carbon dioxid is passed through the apparatus, the receiving flask should be closed with a mercury valve or attached to a U tube containing a portion of the iodin solution. In the progress of the work it was found more convenient to expel the atmosphere by the addition of a small quantity of sodium carbonate, and in this case the guard tube was found to be necessary. After about 100 cc. have distilled over, the excess of iodin is determined with N/10 sodium thiosulfate solution.

SALICYLIC ACID.—The following method was worked out by Mr. W. D. Bigelow, who had charge of this branch of the investigation:

Seventy-five cc. of the wine are placed in a separatory funnel, acidified with 5 cc. of dilute sulfuric acid (H_2SO_4 1 part, H_2O 3 parts), and extracted with a mixture of 8 parts of sulfuric ether and one part of petroleum ether. The ether is washed once with water and then thoroughly shaken with about 25 cc. of water and 6 to 8 drops of a 0.5 per cent solution of ferric chlorid. The aqueous layer containing most of the coloring matter in combination with the iron is discarded. The ether is then washed with water, transferred to a porcelain dish, evaporated to dryness, and the residue heated to the full temperature of the steam bath for a few minutes. When the dish has become cool, from 4 to 5 cc. of water are added, the insoluble matter filtered off after a few minutes, and the filtrate tested for salicylic acid by the addition of 3 to 4 drops of a 0.5 per cent solution of ferric chlorid. By this method an excellent clarification may be obtained with white wines, and with most red wines. Sometimes, however, with the latter a second extraction is necessary.

GENERAL REMARKS CONCERNING THE METHODS OF JUDGMENT.

There being no law in this country which governs and regulates the chemical composition of wines, it was deemed advisable to apply some foreign standard. It is true that our wines, grown under different climatic and soil conditions, cannot be judged with absolute fairness by a standard based on the composition of European natural wines. Such application can only be of value as a means of comparison, and was applied only in such sense.

The standards used were those adopted in the German Empire. On account of the lengthiness of the report made by the Royal Commission empowered to frame the regulations, I will only mention the more salient points relating to the constituents of wine. They are as follows:

Wines which have been prepared solely from pure grape juice contain only rarely less than 1.5 g. extract per 100 cc. If, therefore, a wine is found to contain less, it must be rejected unless it can be proved that other wines of the same type and year exhibit the same peculiarity.

After deduction of the "fixed acid" the extract-rest in natural wines equals at least 1.1 g. per 100 cc., after deduction of the total acid at least 1.0 g.

A wine in which the ash equals more than 10 per cent of the extract should contain a correspondingly larger amount of extract than is usually assumed to be a minimum. In natural wines the ash and extract are very often found to be in the proportion of 1 to 10. A considerable variation from this ratio, however, does not justify the assumption that the wine is adulterated.

In accordance with experience, the free tartaric acid does not amount to more than one sixth of the "fixed acids."

The ratio between glycerol and alcohol can vary in natural wines from 7:100::14:100. Wines having a different ratio have had either alcohol or glycerol added to them.

As during the various manipulations which the wine undergoes small amounts of alcohol (not more than 1 per cent volume) may get into the wine, this must be considered in judging wines. The above limits and ratios are not always applicable to sweet wines.

For the individual inorganic constituents no reliable limits can be given. The supposition that better wines always contain more phosphoric acid is without foundation.

Wines containing less than 0.14 g. ash per 100 cc. must be rejected, unless it is shown that other natural wines of the same type and year show the same peculiarity.

Wines containing more than 0.05 g. NaCl in 100 cc. must be rejected.

Wines containing more than 0.092 g. SO_3 per 100 cc. (corresponding to 2 g. K_2SO_4 per litre) must be designated as having been treated with gypsum, *i. e.*, plastered.

Various circumstances or influences can make a wine ropy, dark, brown, turbid, or bitter, or can change its color, taste, and odor. The coloring matter of red wines may thus be precipitated. None of the above phenomena justify the assumption that the wine is not genuine.

A second fermentation in a wine does not absolutely indicate the addition of sugar or sweet substances. Very often the original fermentation is hindered, or a sweet wine may have been added to the original completely fermented wine.

In only a few samples were deposits noticeable, most of the wines, both white and red, presenting a fine appearance, and showing that they were well matured before being bottled. Deposits were much more prevalent among the white than among the red wines. In the analytical tables the wines are classified by types, and this classification is followed in the discussion as far as practicable.

To facilitate discussion of the results the most important points were arranged as follows:

1. Are substances present which are not characteristic of pure natural wines and deleterious to health?

2. Is the quantitative composition of the wines such as is shown by European natural wines?

3. In what manner have the manipulations varied from those used in the preparation of pure natural wines?

First—Are substances present which are not characteristic of pure natural wines and deleterious to health?

[Under this heading, Mr. Krug entered into some investigations as to non-inverted sucrose, etc., which require further opportunities for analysis and examination of actual wine-making methods before any final opinions could be expressed. He was at first under the impression that "to produce sweet wines it is absolutely necessary to add some saccharine substance to obtain the desired strength in alcohol and requisite sweetness." Grapes, in our typical sweet-wine districts, have such an abundance of natural sugar that no addition is necessary. In certain cases, it is a practice to concentrate sugar by boiling the must to the consistency of a syrup, which is added to satisfy certain demands of the trade; but commercial forms of saccharine are more costly than the natural sugar of the grape, hence they are not used at the wineries for such purposes. After the natural products have been placed on the market, we cannot positively state what additional sweetening they may sometimes be subjected to.

Mr. Krug reports that "there were found only three wines which exceeded the German limit for potassium sulfate," two of which were from one winery, from which he concludes that "plastering" as a fault is not common in California.—C. A. W.]

Plastering is the commercial term applied to the treatment of the grapes with burnt gypsum. All Spanish, Italian, and Greek wines are extensively plastered. In Greece a layer of grapes is placed in a low cistern, well covered with gypsum, which is followed with another layer of grapes in turn covered as before, this being continued until the cistern is full. After from twelve to twenty-four hours the grapes are mashed by treading and the must filled in casks. The use of gypsum secures a quicker ripening and better color. The chemical changes taking place are in brief as follows:

"The potassium bi-tartrate and calcium sulfate react, forming calcium tartrate and potassium acid sulfate, of which the former, on account of its insolubility, separates almost entirely during fermentation. This insolubility is also the cause of the rapid clearing of the wine after fermentation. The improved color of a wine thus treated is stated by Kayser to be due to the presence of free phosphoric acid. Plastering has become very popular in France, as it enables the producers to supply a cheap red wine by avoiding the expense attached to a long period of ripening. Plastered wine contains the same amount of potash as the must, while in a natural wine the precipitation of potassium bi-tartrate decreases the potash more or less. Pure must contains rarely as much as 0.200 g. SO_3 per liter, while in plastered wines this is greatly exceeded, often amounting to 0.80–2.00 g. per liter. Plastered wines always show a higher ash than natural wines. Thus a wine of from eight to ten volume per cent alcohol and 2.2–2.5 g. extract per 100 cc., which normally contains 0.20–0.25 g. ash per 100 cc., will, after plastering, contain 0.28–0.35 g. A plastered wine made from pure must will always contain at least 0.10 g. potash per 100 cc., and usually considerably more.

From a physiological standpoint, the only objection to plastered wines is the presence of potassium sulfate. Although it is evident that the consumption of a large quantity of such wines would be necessary to produce a physiological action on a normal individual, it must likewise be considered that much smaller quantities may be harmful to invalids and children. When we keep the fact in mind that the southern sweet wines are the ones preferred for medicinal use, and at the same time the ones most extensively plastered, we can appreciate the force of these

remarks. None of the California sweet wines analyzed exceeded the limit, 2.0 g. per liter, although one, Port No. 12,710, approached it with 1.861 g. per liter.

[Mr. Krug is of the opinion that our cooperage is excessively sulphured in some cases On this subject, he says that the limit of sulphurous acid in wine, suggested by the Bavarian Representatives of Applied Chemistry, is 0.010 g. per liter, the German law being more restrictive. He further discusses sulphuring as follows:—C. A. W.]

Sulfuring is without doubt one of the most important adjuncts to the manufacture of wine.

The use of sulfurous acid is very old. Arnolf de Villanova mentions it in his work on wine manufacture printed in 1830, and von Holburg in 1587 recommended the use of sulfur to fumigate the casks, and directed to burn three sticks and then close the cask so as to retain the fumes. He found that this insured good and perfect wines that did not deteriorate on standing. In a book published in Nuremberg in 1708 entitled "Der Kuriose Kellermeister," the amount of sulfur required for a 600-liter cask is given as 17 g. In a book published in 1775 under the title "Treatise on the Improvement of Wine and the Prevention of Injurious Practices in Wine Making," this statement is made on page 75: "Fumigation is necessary and important, 1st, to preserve the wine and casks, and 2d, to improve the wine." Only twice have attempts been made to replace sulfur. Once when the use of alcohol was suggested, and again when it was believed that an ideal preservative had been found in synthetic salicylic acid. Neither realized the expectations of its promoters, and sulfuring to-day still holds the same position that it has for centuries. Sulfuring is used to fumigate the casks, to prevent oxidation in the wines, and to prevent diseases peculiar to the wines.

Technically the use of sulfur is without doubt wrong. Wine ages by a slow process of oxidation, which is absolutely interrupted as long as any sulfurous acid is present. As a preservative, sulfurous acid in the amount used is not an unqualified success, as is shown by the necessity of repeating sulfuring when a wine stands for some time before being consumed. Nessler found that from 13 to 81 mg. per liter were required to prevent the browning and turbidity of red wines. Moritz found that the growth of *Mycoderma vini* was not indefinitely hindered until 0.5 per cent of sulfurous acid were present. All these figures far exceed the limits of the European laws.

From a physiological standpoint the presence of sulfurous acid is objectionable, not so much on account of any possible immediate action, but more through the cumulative effect on the digestive tract. Such effects will rapidly become general throughout the whole nervous system. In connection with this the experiments of Braun and Bematzik are of interest. They are the only ones made on man, and showed that doses of from 80 mg. upwards caused serious irritation of the alimentary canal. Husemann and Bischoff recorded several cases where the consumption of freshly sulfured wine caused physiological disturbances and severe headache in persons otherwise accustomed to wine.

A further objection is the formation of bisulfates and even of free sulfuric acid in frequently sulfured wine. These also have a physiological action which cannot well be overlooked.

[Concerning salicylic acid, Mr. Krug reports that he found this preservative in only four samples, of which three were from one firm, and remarks, "it is a pleasure to find it so little used by wine producers in California."—C. A. W.]

Second—Is the quantitative composition of the wines such as is shown by natural wines?

All the wines analyzed show, when compared with European wines, one striking difference—their much lower glycerol-alcohol ratio. According to the German law this should not be lower than 7 nor higher than 14, sweet wines to be excepted. A glance at the analyses will show that in California wines it rarely rises to 8 or above, and that the average is from 5 to 6. Baumert in his work on seven California wines also found this to be the case, and makes the assertion that it is due to a slight alcoholizing of the wines. In our work we have, however, found it to be a general characteristic, and it hardly seems possible that wine producers should practice this mode of fortification so universally. I am rather inclined to believe that the proper solution of the problem will be found in a careful study of the processes of fermentation as they take place in the California wines.

A comparison between the composition of California wines and European wines of the same type is difficult, as the propriety of applying the same form of judgment to two kinds of wine, grown under different conditions of soil and climate, is doubtful. Still, it may be of interest to call attention to the points wherein they differ.

For purposes of comparison, the analyses given in König, Chemie der menschlichen Nahrungs- und Genussmittel, were used.

WINES OF THE RHENISH TYPE.

The California Riesling is distinguished, according to these analyses, by a higher alcohol and lower extract content and a somewhat lower acidity. The percentage of glycerol present is in most cases much lower. The California Riesling varies from 8.45 to 11.67 per cent alcohol by weight, 1.66 to 2.61 per cent extract, 0.478 to 0.658 per cent total acid as tartaric acid, and 0.501 to 0.932 per cent glycerol, while German Riesling varies from 5.90 to 10.15 per cent alcohol by weight, 1.70 to 3.21 per cent extract, 0.395 to 1.250 per cent total acid as tartaric acid, and 0.49 to 1.34 per cent glycerol.

California Gutedel, on the other hand, is higher both in alcohol and extract, while the acidity is somewhat lower. It varies from 9.67 to 11.16 per cent alcohol by weight, 1.67 to 2.34 per cent extract, and 0.467 to 0.662 per cent total acidity. German Gutedel shows from 7.12 to 8.23 per cent alcohol by weight, 1.67 to 2.01 per cent extract, and 0.241 to 0.830 total acidity. The California wine shows, in accordance with its higher percentage of extract, a higher ash than the German wine.

No analyses of German Hock could be found, so it is impossible to draw comparisons on this wine, though its close agreement with the two wines just discussed make it highly probable that it will exhibit the same characteristics. In general these wines are all somewhat stronger in alcohol and higher in extract than the German wines of the same type.

WINES OF THE SAUTERNE TYPE.

A comparison of the minima and maxima and means of American Sauterne with those of French Sauterne shows that although the average California Sauterne shows a higher alcohol-content, wines are found on the French market that exceed the highest found in our work. Cali-

fornia Sauterne shows a lower extract and acidity, while the percentage of glycerol is far below that found in French wines. The following figures will exhibit this: California Sauterne: alcohol by weight, 8.43 to 12.18 per cent; extract, 1.70 to 4.03 per cent; acidity, 0.422 to 0.641 per cent, and glycerol, 0.178 to 0.850 per cent. French Sauterne: alcohol by weight, 9.05 to 12.49 per cent; extract, 2.47 to 3.54 per cent; acidity, 0.540 to 0.750 per cent, and glycerol 0.866 to 1.030 per cent.

The same general characteristics are true of the other miscellaneous California white wines analyzed. On the whole all these wines exhibit a higher alcohol, somewhat lower extract and acidity, and a much lower percentage of glycerol.

WINES OF THE CLARET TYPE.

The various California representatives of the claret type, the most important of which is the Zinfandel, all show a higher percentage of alcohol, extract, and total acid, and a lower glycerol-content than the French clarets. California Zinfandel shows the following minima and maxima: alcohol by weight, 9.15 to 10.50 per cent; extract, 2.28 to 3.37 per cent; total acidity, 0.635 to 0.871 per cent; glycerol, 0.446 to 0.634 per cent. California claret gives the following figures: alcohol by weight, 9.16 to 11.23 per cent; extract, 2.36 to 3.34 per cent; total acidity, 0.601 to 0.783 per cent, and glycerol, 0.454 to 0.620 per cent. French clarets vary within the following limits: alcohol by weight, 7.45 to 9.32 per cent; extract, 2.09 to 3.06 per cent; total acidity, 0.470 to 0.780, and glycerol, 0.550 to 0.990 per cent. In accordance with the higher extract a higher ash was found in California clarets, viz.: 0.235 to 0.342 per cent, French clarets giving 0.190 to 0.310 per cent.

WINES OF THE MEDOC TYPE.

These wines are represented in California by the Cabernet, Malbec, and Medoc. Only the last could be compared with French wines, no analyses of wines of the first two sub-types being found. Here it was again found that the California wines were characterized by a higher percentage in alcohol, extract, and acidity, while the glycerol was much lower than in the French Medocs.

The following minima and maxima were obtained: California Medocs: alcohol by weight, 11.75 to 12.40 per cent; extract, 2.33 to 2.92 per cent; acidity, 0.614 to 0.824 per cent, and glycerol, 0.371 to 0.556 per cent. French Medocs: alcohol by weight, 9.50 to 10.70 per cent; extract, 1.96 to 2.60 per cent; total acidity, 0.380 to 0.680 per cent, and glycerol, 0.640 to 1.040 per cent. Corresponding to the higher extract a higher ash was found in the domestic wines, viz.: 0.301 to 0.386, French Medocs showing from 0.210 to 0.297 per cent.

WINES OF THE BURGUNDY TYPE.

Only one analysis of a Burgundy wine was found in König. A comparison with this showed the California Burgundies to contain a higher percentage of alcohol, extract, acidity, and ash than French Burgundy, while the glycerol is lower. The following minima and maxima and means were obtained:

California Burgundy.

	Minima—Per Cent.	Maxima—Per Cent.	Mean—Per Cent.
Alcohol by volume	10.97	15.48	12.57
Extract	2.20	3.48	2.79
Acidity	.594	.783	.674
Ash	.190	.362	.283
Glycerol	.464	.640	.551

California Mataro.

	Minima—Per Cent.	Maxima—Per Cent.	Mean—Per Cent.
Alcohol by volume	9.58	13.40	12.38
Extract	2.24	3.39	2.79
Acidity	.601	.837	.673
Ash	.203	.322	.278
Glycerol	.544	.583	.553

French Burgundy.

Alcohol by volume	11.23 per cent.
Extract	2.63 per cent.
Acidity	.590 per cent.
Ash	.210 per cent.
Glycerol	.680 per cent.

A general comparison of all California dry wines shows, therefore, that they are characterized by a high percentage of alcohol and low percentage of glycerol. In the white wines the extract, acidity, and ash are generally lower than in foreign wines, while in the red wines these constituents are higher.

SWEET WINES.

Wines of the Sherry Type.

California Sherries on the whole are lower in alcohol than Spanish Sherries. They are higher in extract, which is due to the presence of unfermented grape sugar. The total acidity is higher, while the ash and glycerol are lower. Following are the minima and maxima: California Sherries: alcohol by weight, 14.38 to 17.57 per cent; extract, 3.33 to 9.38 per cent; acidity, 0.378 to 0.797 per cent; reducing sugar, 1.20 to 6.17 per cent; ash, 0.211 to 0.420 per cent; glycerol, 0.325 to 0.722 per cent. Spanish Sherries: alcohol by weight, 16.01 to 19.88 per cent; extract, 2.69 to 5.40 per cent; acidity, 0.250 to 0.640 per cent; reducing sugar, 0.52 to 3.77 per cent; ash, 0.200 to 0.660 per cent; glycerol, 0.220 to 0.910 per cent.

Wines of the Port Type.

These wines exhibit in general the same characteristics in comparison with Portuguese Ports as the Sherries, namely, a slightly lower percentage of alcohol, and a higher extract and acidity. The glycerol in these wines is slightly higher. The higher extract is due to the presence of unfermented grape sugar. The following data were obtained: California Ports: alcohol by weight, 11.97 to 17.40 per cent; extract, 8.52 to 16.51 per cent; acidity, 0.412 to 0.674 per cent; reducing sugar, 5.16 to 13.00 per cent, and glycerol, 0.161 to 0.688. Portuguese Ports: alcohol by weight, 15.71 to 17.87 per cent; extract, 6.69 to 9.90 per cent; acidity, 0.290 to 0.470 per cent; reducing sugar, 4.42 to 8.12 per cent, and glycerol, 0.230 to 0.710 per cent.

COMPARISON OF CALIFORNIA MUSCATEL WITH OTHER WINES OF THAT NAME.

California Muscatel approaches the Syrian Muscatel in its alcohol content. No strict comparisons can be drawn between it and Sicilian Muscatels, as the latter vary within too wide limits. It is stronger in alcohol and has in general a lower extract than the Greek Muscatels, due no doubt to the fact that a large quantity of concentrated must is added to the finished wine in Greece so as to obtain a very sweet product. The glycerol content is higher, and the ash and total acidity lower than in foreign Muscatels.

The following minima and maxima will show the differences existing:

California Muscatel.

	Minima—Per Cent.	Maxima—Per Cent.	Mean—Per Cent.
Alcohol by weight	10.45	15.50	13.63
Extract	17.01	18.62	17.55
Acidity	.317	.405	.369
Reducing sugar	13.18	16.30	14.66
Glycerol	.866	1.014	.941
Ash	.148	.192	.113

Syrian Muscatels.

Alcohol by weight	10.67	15.26	13.63
Extract	4.22	18.86	9.76
Acidity	.430	.830	.646
Reducing sugar	.25	4.50	3.13
Glycerol	.320	2.00	.857
Ash	.210	.960	.495

Greek Muscatels.

Alcohol by weight	9.44	11.62	10.57
Extract	13.32	24.13	15.27
Acidity	.410	.751	.566
Reducing sugar	13.50	18.86	15.01
Glycerol	.564	.950	.718
Ash	.290	.388	.321

Sicilian Muscatels.

Alcohol by volume	6.00	24.66	15.34
Extract	3.56	38.18	20.08
Acidity	.270	1.140	.630
Reducing sugar	12.50	29.01	17.16
Glycerol	----------	----------	----------
Ash	.170	.860	.410

Five other samples of sweet wine were analyzed, namely, three Angelicas, one Tokay, and one Catawba. Of these, the Tokay is the most interesting, as it differs in every respect from the Hungarian Tokays. The percentages of alcohol and glycerol present are much higher, the extract, reducing sugar, acidity, and ash, lower. It is a more completely fermented wine.

* * * * * * * * *

On the whole it is evident that the California dry wines are fully equal to the European wines, and the red wines are in every respect superior to the young French clarets. The sweet wines are to be

unconditionally preferred to the European Southern wines containing the same amount of alcohol and extract, and not being plastered. Their superiority is already being appreciated in Europe, and it is only a question of time when an extensive foreign market will be open to this, one of our most promising home products.

CHEMICAL ANALYSIS OF CALIFORNIA WINES.

A Paper from J. M. Curtis & Son, of San Francisco.

In compliance with the request of the Secretary of the Board of State Viticultural Commissioners, we had prepared for publication in this bulletin the results of our analyses, extending through several years, of California wines of various types and from nearly all the wine-producing sections of the State. As our analyses were mostly made for commercial purposes, they were limited to partial examination for such purposes as were demanded by the persons who furnished the samples—and we were generally ignorant of the origin of the wines examined; but we hoped by tabulating the different tests of wines the origin of which we knew, and supplementing the tables with the few exhaustive analyses we have made of typical wines, to give a paper on the chemical constitution and characteristics of California wines that would be of some interest to the viticulturists of our State. We felt very keenly our want of data upon which to base a precise and instructive paper, but we thought at least we might do some good by showing that our wines vary very materially from the showing made some years ago by analyses made in Washington of samples obtained there from retailers. Those analyses showed a deficiency in body (extract) which would condemn the wines as impure, according to the standards universally accepted by wine chemists. In our examination of wines for extract (and we have tested many hundreds) we have found the average ratio to be in excess even of the extract found in European wines of the same type.

Fortunately for the State, and for us, the Chemical Congress of the Midwinter Fair brought to our city Dr. H. W. Wiley, Chief Chemist of the United States Department of Agriculture. He brought with him, to be read at the Chemical Congress, a paper on "Some Characteristics of California Wines," written by his able assistant, Mr. W. H. Krug, under whose supervision nearly two hundred genuine samples of California wines, which had been exhibited at the World's Columbian Exposition in Chicago, were carefully and exhaustively analyzed, and the results tabulated and compared with the analyses of European wines of similar types. Dr. Wiley kindly gave us this paper with permission to use it in any way we might think beneficial to the State, and we gladly substitute it for the meager and unsatisfactory paper we had intended to publish.

We venture, however, to comment upon that portion of it relating to our sweet wines. Commercial glucose has undoubtedly in a few isolated instances been used in our sweet wines, but those instances are few and far between. Our grapes yield a very large percentage of sugar, and even when that sugar is not retained in sufficient quantity by arresting the fermentation at an early stage, the cheapest possible source of sugar, as well as the best, is still the grape, from which it is obtained by boiling the must.

We deprecate this method of fortifying sweet wines with boiled or concentrated must, after fermentation has proceeded long enough to develop 10 or 12 per cent of alcohol, believing it much better to arrest the fermentation with brandy after only 2 to 5 per cent of alcohol, according to the sweetness of the must, has been developed; but the concentrated must is not glucose. It is much better than that, or cane sugar, as recommended by Mr. Krug. It is certainly cheaper, and does not detract so much from the vinosity of the wine. But in these analyses made by Mr. Krug, the polariscope shows a residuum of unfermented glucose. He says "it is quite certain, however, that some normal California wines can be shown to possess this property"—that is, a dextro-rotation—and if some wines can be an exception, is it probable that twenty-seven out of twenty-eight samples of sweet wines analyzed owe their dextro-rotation to added glucose?

The percentages of extract in Mr. Krug's tables fully corroborate our own results, and differ widely from those tests made of wines purporting to be Californian, but obtained from Eastern retailers, and which tests were published in Bulletin 13, Part 3, Division of Chemistry. Below we have added a table of the average of our tests of extract of red wines from some of the wine-producing sections of the State, and our analyses of a few typical wines.

The excess of sulfurous acid found in many of the samples analyzed by Mr. Krug, is unquestionably due, in most instances, to excessive sulfuring of the casks, but in some cases it may be due to the use of potassium bi-sulfite, which, under different names, is sold in this market, and to some extent used in clarifying white wines. Its effect is worse than that of sulfuring, as the only good it can accomplish is produced by sulfuring, while at the same time it decomposes the potassium bitartrate, the source of the healthful and agreeable acidity of the wine, and makes it flat and insipid.

We think it unfortunate that the department has adopted tables of specific gravities corresponding to strength of alcoholic solutions, differing from the tables prepared by the National Academy of Sciences, and adopted by Congress as the legal standard. For commercial purposes, only the legal standard can be observed. It agrees very closely with the tables adopted December 27, 1884, by the French Government, and its use by the Internal Revenue Department would avoid confusion, and give a degree of uniformity to alcoholic analysis desirable not only in our own Revenue Department, but in our foreign commerce. In wines for export, of course, only the tables standard in the country to which the wine is exported can be used. But for wines or alcoholic compounds imported, there should be but one standard—that adopted by Act of Congress.

J. M. CURTIS & SON.

Extract of Natural Red Wines.

	Maximum.	Mean.	Minimum.
Alameda County	3.45	3.04	2.45
Amador County	3.09	2.79	2.57
Santa Clara County	3.40	2.95	2.32
Santa Cruz County	3.18	2.96	2.69
Sonoma County	3.45	2.89	2.54
Napa County	3.72	2.86	2.49

Analysis of Some California Wines.

Kind.	Where Produced.	Specific Gravity at 60° F.	Alcohol. By Volume.	Alcohol. By Weight.	Dry Extract	Ash	Total Acidity as Tartaric	Volatile Acid as Acetic	Fixed Acid as Tartaric	Potassium Bi-tartrate	Free Tartaric Acid	Tannin	Glycerine	Total Nitrogen	Malic Acid
White Wines	Sonoma Hills	.99268	11.38	9.16	1.89	.137	.675	.096	.555	.1175	.0562	.043	.566	.024	.0963
Traminer	Sonoma Valley	.99173	14.15	11.46	2.49	.208	.600	.084	.510	.1034	.0187	.065	.962	.160	.1216
Burger	Santa Clara	.99423	9.93	8.00	1.94	.169	.517	.150	.330	....	....	....	.731	.0316	....
Burgundy	Santa Cruz Mts.	.99407	13.12	10.60	2.75	.258	.630	.142	.450	.0517	....	.286	.659	.045	.1228
Claret	Napa Valley	.99545	11.33	9.11	2.49	.225	.600	.108	.465	.0752	.0037	.332	.406	.058	.0219
Zinfandel	Santa Cruz Mts.	.99528	13.51	10.92	3.18	.211	.705	.132	.540	.0370	none.	.442	.780	.0556	....

Expressed in grains per 100 cc.

Composition of the Ash of Some California Wines.

Kind.	Percentage of Pure Ash	Potash	Soda	Lime	Magnesia	Peroxide of Iron and Alumina	Br. Oxide of Manganese	Phosphoric Acid	Sulfuric Acid	Silica	Chlorin	Total	Less Excess Oxygen Due to Chlorin	Total
White Wine	.137	54.61	1.91	10.36	2.56	2.21	.38	7.90	16.48	1.77	1.80	99.98	.39	99.59
Traminer	.208	38.40	1.68	5.79	3.84	2.69	.31	11.32	31.55	2.69	1.72	99.99	.37	99.62
Burgundy	.258	50.39	1.66	5.32	9.16	1.11	.94	15.52	11.34	2.15	2.45	100.04	.54	99.50
Claret	.225	55.48	1.19	4.25	7.95	1.05	1.72	14.49	10.57	1.29	2.00	99.98	.44	99.54

LIST OF SAMPLES OF WINES RECEIVED FROM THE CALIFORNIA VITICULTURAL COMMISSION.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF CHEMISTRY,
WASHINGTON, D. C., September 5, 1894.

Mr. C. A. WETMORE, *care California Viticultural Commission, San Francisco, Cal.:*

DEAR SIR: I beg to comply with your request, and inclose a complete list of the samples of wine received from the Viticultural Commission.

Respectfully,

H. W. WILEY,
Chemist.

(Inclosure.)

No.	Name.	Grower.
12627	St. Hubert Port	Cal. Wine Growers' Union, San Francisco.
12628	St. Hubert Sherry	Cal. Wine Growers' Union, San Francisco.
12629	Riesling, 1887	F. Albertz, Cloverdale.
12630	St. Hubert Sauterne	Cal. Wine Growers' Union, San Francisco.
12631	St. Hubert Sauterne, Ch. Yquem	Cal. Wine Growers' Union, San Francisco.
12632	St. Hubert Margaux	Cal. Wine Growers' Union, San Francisco.
12633	St. Hubert Claret	Cal. Wine Growers' Union, San Francisco.
12634	Zinfandel	G. Migliavacca, Napa City.
12635	Claret	H. Lefranc, San José.
12636	Sauterne	H. Lefranc, San José.
12637	Burgundy	H. Lefranc, San José.
12638	Hock	H. Lefranc, San José.
12639	Riesling	H. Lefranc, San José.
12640	Muscatel	Wm. Palmtag, Hollister.
12641	Gutedel	Wm. Palmtag, Hollister.
12642	Cabernet	Wm. Palmtag, Hollister.
12643	Johannisberger Riesling	Wm. Palmtag, Hollister.
12644	Pinot Gris, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12645	Sauvignon Cabernet	Wm. Palmtag, Hollister.
12646	Riesling, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12647	Tipo Chianti, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12648	Burgundy, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12649	Barbera, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12650	Burger, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12651	Zinfandel, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12652	Gutedel	Wm. Wehner, Evergreen.
12653	Chateau Yquem	Wm. Wehner, Evergreen.
12654	Haut Sauterne	Wm. Wehner, Evergreen.
12655	Sauterne	Wm. Wehner, Evergreen.
12656	Cabernet El Quito, table wine	Santa Clara County.
12657	El Quito, dessert wine	Santa Clara County.
12658	Port Trousseau, vintage 1884	L. J. Rose Co., Limited, San Gabriel.
12659	Burgundy	J. C. Merithew, San José.
12660	Zinfandel	J. C. Merithew, San José.
12661	Cabernet	J. C. Merithew, San José.
12662	Jurancoa	A. G. Chauché, San Francisco.
12663	Chablis	A. G. Chauché, San Francisco.
12664	Sherry, vintage 1882	L. J. Rose Co., Limited, San Gabriel.
12665	Haut Sauterne, 1888	Geo. West & Son, Stockton.
12666	Hock	Ewer & Atkinson, Rutherford.

No.	Name.	Grower.
12667	Burgundy	Ewer & Atkinson, Rutherford.
12668	Sauterne	Ewer & Atkinson, Rutherford.
12669	Cabernet	Ewer & Atkinson, Rutherford.
12671	Zinfandel	H. W. Crabb, Oakville.
12672	Hermitage	H. W. Crabb, Oakville.
12673	Burgundy	H. W. Crabb, Oakville.
12674	Claret	H. W. Crabb, Oakville.
12675	Chablis	H. W. Crabb, Oakville.
12676	Riesling	H. W. Crabb, Oakville.
12677	Cabernet Traminer	J. Gundlach & Co., San Francisco.
12678	Cabernet Gutedel	J. Gundlach & Co., San Francisco.
12679	Port	J. Gundlach & Co., San Francisco.
12680	Tokay	J. Gundlach & Co., San Francisco.
12684	Chateau Gundlach	J. Gundlach & Co., San Francisco.
12685	Sauterne	J. Gundlach & Co., San Francisco.
12686	Semillon	J. Gundlach & Co., San Francisco.
12687	Cabernet Sauvignon, Medoc	J. Gundlach & Co., San Francisco.
12688	Burgundy	J. Gundlach & Co., San Francisco.
12689	Chambertin, Burgundy	J. Gundlach & Co., San Francisco.
12690	Cabernet	Napa Valley Wine Co., San Francisco.
12691	Angelica, 1890	Julius P. Smith, Livermore.
12692	Sauterne, 1889	Los Hermanos Vy'd, Beringer Bros., St. Helena.
12693	Claret, 1889	Los Hermanos Vy'd, Beringer Bros., St. Helena.
12694	Zinfandel, 1889	Los Hermanos Vy'd, Beringer Bros., St. Helena.
12695	Burgundy, 1889	Los Hermanos Vy'd, Beringer Bros., St. Helena.
12696	Old Hock, 1889	Los Hermanos Vy'd, Beringer Bros., St. Helena.
12697	Riesling, 1889	Los Hermanos Vy'd, Beringer Bros., St. Helena.
12698	Sauterne, 1888	Julius P. Smith, Livermore.
12699	Haut Sauterne, 1887	Julius P. Smith, Livermore.
12700	Haut Sauterne, 1888	Julius P. Smith, Livermore.
12701	Haut Sauterne, 1890	Julius P. Smith, Livermore.
12702	Haut Sauterne, 1891	Julius P. Smith, Livermore.
12703	Claret, 1890	Julius P. Smith, Livermore.
12704	Cabernet, 1890	Julius P. Smith, Livermore.
12705	Malbec, 1891	Julius P. Smith, Livermore.
12706	Zinfandel, 1891	Julius P. Smith, Livermore.
12707	Burgundy, 1888	Julius P. Smith, Livermore.
12708	Riesling, 1887	Julius P. Smith, Livermore.
12709	Riesling, 1890	Julius P. Smith, Livermore.
12710	Port	I. De Turk, Santa Rosa.
12711	Sherry	I. De Turk, Santa Rosa.
12712	Cabernet	I. De Turk, Santa Rosa.
12713	Zinfandel	I. De Turk, Santa Rosa.
12714	Burgundy	I. De Turk, Santa Rosa.
12715	Sauterne	I. De Turk, Santa Rosa.
12716	Riesling	I. De Turk, Santa Rosa.
12717	Burgundy (Red Seal)	Ben Lomond Wine Co., Santa Cruz County.
12718	Burgundy (Gold Seal)	Ben Lomond Wine Co., Santa Cruz County.
12719	Claret	Ben Lomond Wine Co., Santa Cruz County.
12720	Grey Riesling, 1887	Ben Lomond Wine Co., Santa Cruz County.
12721	Grey Riesling, 1888	Ben Lomond Wine Co., Santa Cruz County.
12722	Claret	Howes' Vineyard, Mountain View.
12723	Cabernet	Howes' Vineyard, Mountain View.
12724	Sauterne	Howes' Vineyard, Mountain View.
12725	Riesling	Howes' Vineyard, Mountain View.
12726	Chablis	C. C. McIver, Mission San José.
12727	Sauterne	C. C. McIver, Mission San José.
12728	Zinfandel	C. C. McIver, Mission San José.
12729	Hock, Linda Vista	C. C. McIver, Mission San José.
12730	Riesling, Linda Vista	C. C. McIver, Mission San José.
12731	Moselle, Linda Vista	C. C. McIver, Mission San José.
12732	Burgundy	Jacob Schram, St. Helena.
12733	Claret	Jacob Schram, St. Helena.
12734	Sauterne	Jacob Schram, St. Helena.
12735	Sauvignon Vert	Jacob Schram, St. Helena.
12736	Hock	Jacob Schram, St. Helena.
12737	Riesling	Jacob Schram, St. Helena.
12738	Chablis, Asti	Italian-Swiss Agricultural Col'y, Sonoma Co.
12739	Chasselas, Asti	Italian-Swiss Agricultural Col'y, Sonoma Co.
12740	Sweet Muscatel, Asti	Italian-Swiss Agricultural Col'y, Sonoma Co.

No.	Name.	Grower.
12741	Mataro, Asti	Italian-Swiss Agricultural Col'y, Sonoma Co.
12742	Barolo, Asti	Italian-Swiss Agricultural Col'y, Sonoma Co.
12743	Port, Asti	Italian-Swiss Agricultural Col'y, Sonoma Co.
12744	Malbec, 1888	Julius P. Smith, Livermore.
12745	Burgundy, 1891	Julius P. Smith, Livermore.
12746	Cabernet, 1888	Julius P. Smith, Livermore.
12747	Zinfandel, 1888	Julius P. Smith, Livermore.
18748	Sauterne, 1890	Julius P. Smith, Livermore.
12749	Port, 1892	Julius P. Smith, Livermore.
12750	Sauterne	H. W. Crabb, Oakville.
12751	Port	H. W. Crabb, Oakville.
12752	Muscatel	H. W. Crabb, Oakville.
12753	Catawba	H. W. Crabb, Oakville.
12754	"El Quito" table wine, Carignane	Santa Clara County.
12757	Haut Medoc, Cote d'Eta, 1890	
12758	Haut Medoc, Cote d'Eta, 1891	
12759	White Burgundy, Cote d'Eta, 1891	
12760	Haut Sauterne, Cote d'Eta, 1890	
12761	Haut Sauterne, Cote d'Eta, 1891	
12762	Hedgeside Cabernet, 1885	Hedgeside Vineyard, Napa.
12763	Hedgeside Cabernet, 1886	Hedgeside Vineyard, Napa.
12764	Mataro, 1890	Chas. M. Hammond, Upper Lake.
12765	Mataro, 1891	Chas. M. Hammond, Upper Lake.
12766	White Semillon, 1890	Chas. M. Hammond, Upper Lake.
12767	White Semillon, 1891	Chas. M. Hammond, Upper Lake.
12768	Semillon, 1890	F. W. Billing, Redwood City.
12769	Gutedel, 1890	F. W. Billing, Redwood City.
12770	Marsanne, 1890	F. W. Billing, Redwood City.
12771	Sauvignon Vert, 1890	F. W. Billing, Redwood City.
12772	Franken Riesling, 1890	F. W. Billing, Redwood City.
12773	Green Hungarian, 1890	F. W. Billing, Redwood City.
12774	Sauterne Souvenir, Cresta Blanca	Chas. A. Wetmore, Livermore.
12775	Chateau Yquem, Cresta Blanca	Chas. A. Wetmore, Livermore.
12776	Table d'Hote, Cresta Blanca	Chas. A. Wetmore, Livermore.
12777	Alto Douro, Cresta Blanca	Chas. A. Wetmore, Livermore.
12778	Angelica, 1888	Barton Estate Co., Limited, Barton Vineyard, Fresno County.
12779	Cabernet, 1890	I. De Turk, Santa Rosa.
12781	Ruby Hill Claret	J. Crellin & Sons, Livermore.
12782	Ruby Hill Cabernet	J. Crellin & Sons, Livermore.
12783	Ruby Hill Burgundy	J. Crellin & Sons, Livermore.
12784	Ruby Hill Sauterne	J. Crellin & Sons, Livermore.
12785	Ruby Hill Haut Sauterne	J. Crellin & Sons, Livermore.
12786	Ruby Hill Hock	J. Crellin & Sons, Livermore.
12787	Ruby Hill Riesling	J. Crellin & Sons, Livermore.
12788	Claret, 1886	G. Migliavacca, Napa City.
12789	Zinfandel, 1888	F. Albertz, Cloverdale.
12790	Chateau Moulton	F. Albertz, Cloverdale.
12791	Sauterne, 1887	F. Albertz, Cloverdale.
12792	Golden Chasselas	J. L. Beard, Warm Springs.
12793	Mataro	J. L. Beard, Warm Springs.
12794	Zinfandel	J. L. Beard, Warm Springs.
12795	Zinfandel	Otto Normann, Howell Mountain.
12796	Cabernet Sauvignon	Otto Normann, Howell Mountain.
12797	Riesling	Otto Normann, Howell Mountain.
12798	Cabernet Gutedel	Otto Normann, Howell Mountain.
12799	Traminer, 1890	F. W. Billing, Redwood City.
12800	Mondeuse, 1890	F. W. Billing, Redwood City.
12801	Port	C. C. McIver, Mission San José.
12802	Rhine Wine type, 1891	Tiburcio Parrott, St. Helena.
12803	Medoc, Chateau Margaux ty. 1889	Tiburcio Parrott, St. Helena.
12804	Sauterne type, 1889	Tiburcio Parrott, St. Helena.
12805	Sherry	Lisbon Winery Co., Mathews, Napa County.
12806	Zinfandel	Lisbon Winery Co., Mathews, Napa County.
12807	Riesling	Lisbon Winery Co., Mathews, Napa County.
12808	Claret, 1887	George West & Son, Stockton.
12809	Claret, 1888	George West & Son, Stockton.
12810	Claret, 1889	George West & Son, Stockton.
12811	Port, 1882	George West & Son, Stockton.
12812	Port, 1885	George West & Son, Stockton.

No.	Name.	Grower.
12813	Port, 1886	George West & Son, Stockton.
12814	Port, 1888	George West & Son, Stockton.
12815	Sherry, 1885	George West & Son, Stockton.
12816	Sauvignon, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12817	Pinot Blanc, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12818	Sauterne, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12819	Dry Muscatel, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12820	Angelica, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12821	Sherry, Asti	Italian-Swiss Agricultural Colony, Sonoma Co.
12823	Zinfandel	C. Carpy & Co., San Francisco.
12824	La Loma, 1886	C. Carpy & Co., San Francisco.
12825	Burgundy	C. Carpy & Co., San Francisco.
12826	Riesling	C. Carpy & Co., San Francisco.
12827	Sauterne	C. Carpy & Co., San Francisco.
12828	Johannisberg Riesling	F. Haesters, Wrights.

TABLES

SHOWING

RESULTS OF THE ANALYSES BY W. H. KRUG, DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

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CALIFORNIA WINES—TABLE XII.

Table of Results of Experiments made to Determine the Effect the Presence of Commercial Glucose has on the Polarization after Fermentation.

Original Polarization of Sucrose.	Original Polarization of Glucose.	Polarization after Two Days.	Polarization after Four Days.	Original Polarization of Sucrose.	Original Polarization of Glucose.	Polarization after Two Days.	Polarization after Four Days.
+ 37.80	....	0	0	+ 11.54	+ 16.33	+ 3.5	+ 2.3
				+ 11.54	+ 16.33	+ 3.0	+ 2.3
+ 18.90	....	0	0				
				+ 3.85	+ 16.33	+ 3.7	+ 2.4
+ 9.45	....	0	0	+ 3.85	+ 16.33	+ 3.6	+ 3.9
....	+ 16.33	+ 4.5	+ 5.0	+ 19.23	+ 9.8	+ 2.0	+ 1.7
....	+ 16.33	+ 4.8	+ 3.8	+ 19.23	+ 9.8	+ 2.8	+ 2.1
....	+ 9.8	+ 2.0	+ 1.8	+ 19.23	+ 3.27	+ .7	+ .9
....	+ 9.8	+ 2.5	+ 1.8	+ 19.23	+ 3.27	+ .7	+ .5
....	+ 3.27	+ .4	0	+ 11.54	+ 9.8	+ 2.4	+ 1.0
....	+ 3.27	+ 1.0	0	+ 11.54	+ 9.8	+ 2.3	+ 1.0
+ 19.23	+ 16.33	+ 4.6	+ 2.8	+ 3.85	+ 9.8	+ .9	+ .3
+ 19.23	+ 16.33	+ 3.5	+ 3.3	+ 3.85	+ 9.8	+ .8	+ .3